# Energy Transition Factbook 2024

**Prepared for the 15th Clean Energy Ministerial Meeting**

October 2024

CLEAN ENERGY MINISTERIAL
Advancing Clean Energy Together

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# Cover letter

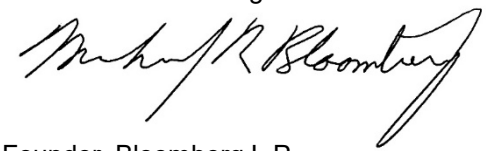
When it comes to tackling climate change, the data is clear: We're making progress, but not enough – and not fast enough. This year's Energy Transition Factbook examines that progress and where more is needed, with a special focus on the key trends and solutions across the clean energy market and two pillars of the economy: heavy industry and transportation.

At COP28, world leaders committed to tripling renewable energy production by 2030. Last year, renewable energy and electrified transport investment hit a record high, as global energy transition investment reached over $1.7 trillion. In the transportation industry, electric vehicles now represent nearly 20% of all sales for global passenger vehicles. In the US, the federal government continues to implement the Inflation Reduction Act, which is moving us toward our net-zero goals.

Yet as this factbook makes clear, there is still a very long way to go. And as climate change upends more and more lives and economies around the world, we must act with boldness and urgency. The more we all work together, the faster we can make progress.

We hope this factbook will give policymakers and other leaders data that can help them address barriers to investment – and design incentives that can help build a healthier, stronger, more sustainable world.

Sincerely,
Michael R. Bloomberg



Founder, Bloomberg L.P.
Founder, Bloomberg Philanthropies
UN Secretary-General's Special Envoy on Climate Ambition and Solutions

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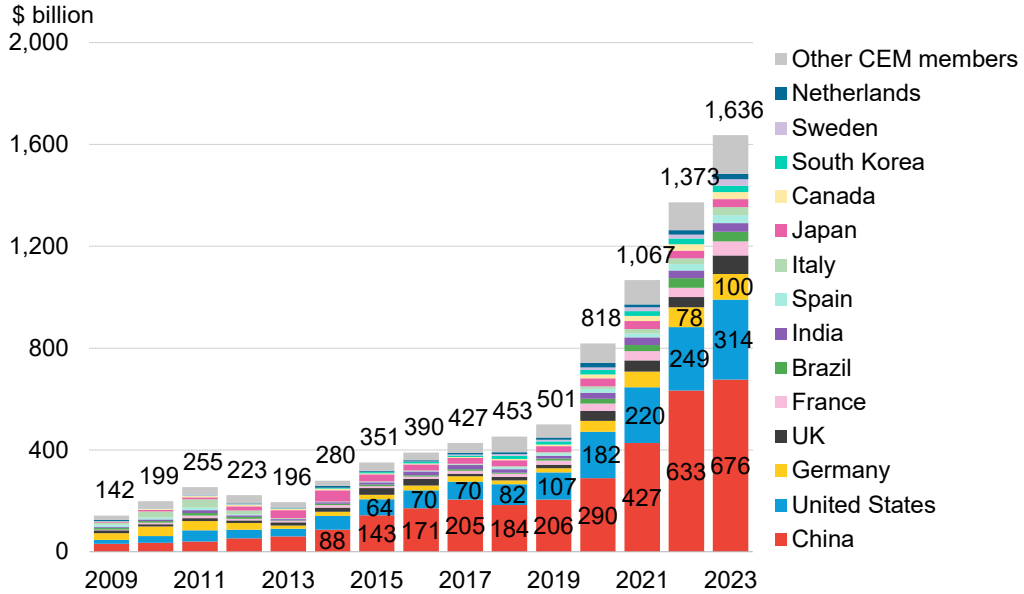


*Source: BloombergNEF. Note: Start years differ by sector but all are present from 2020 onwards. Most notably, nuclear figures start in 2015 and power grids in 2020. 'Other CEM members' includes all CEM members not specified in the chart, including European Commission members that do not hold individual CEM membership status. Considers 2024 CEM membership status.*

Clean Energy Ministerial (CEM) members, including the European Union, have attracted 90% of worldwide investment in energy transition technologies in the last 15 years. That's a cumulative $8.3 trillion investment in the energy transition.

Together, CEM members spent nearly $1.6 trillion on the energy transition in 2023 – double the $818 billion they invested in 2020. Investment has increased every single year since 2013, including a 19% jump from 2022 to 2023, and shows no sign of slowing down.

China has attracted the most investment in the last 15 years, followed by the US and Germany. At $3.2 trillion, investment in China accounted for 39% of CEM members' cumulative investment, while the US and Germany attracted $1.5 trillion and $0.5 trillion, respectively

*Energy transition investment* is BNEF's term for money spent to deploy clean technologies such as clean energy, electric vehicles, heat pumps, hydrogen, carbon capture and more recently, power grids.



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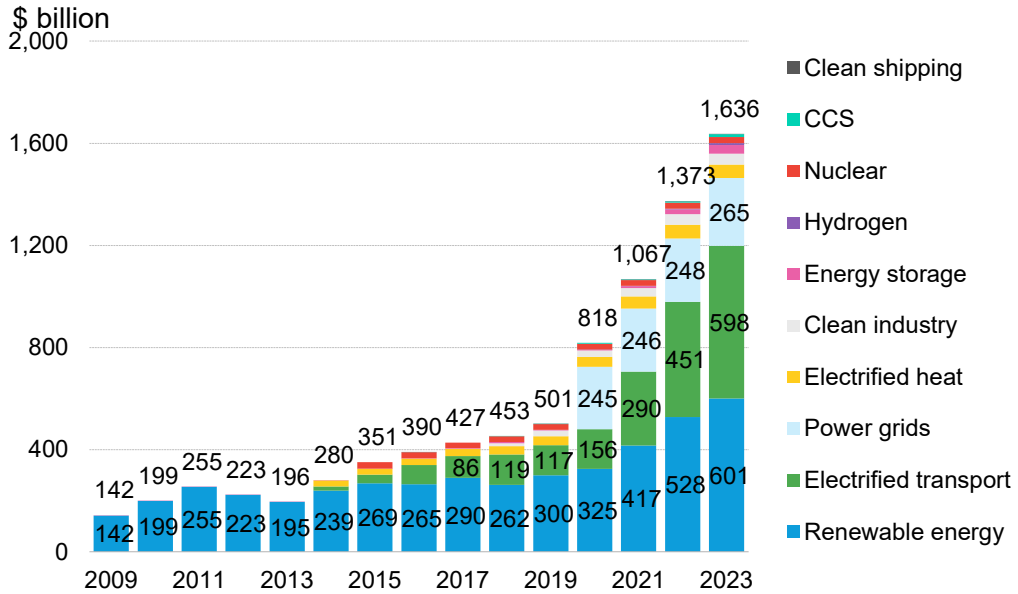
# Renewables and transport accounted for most of CEM members' investment

## CEM members' annual energy transition investment, by technology




*Source: BloombergNEF. Note: Start years differ by sector, but all sectors are present from 2020 onwards. Most notably, nuclear figures start in 2015 and power grids in 2020. 'CCS' refers to carbon capture and storage. 'Renewable energy' refers to wind (on- and offshore), solar (large- and small-scale), biofuels, biomass and waste, marine, geothermal and small hydro.*

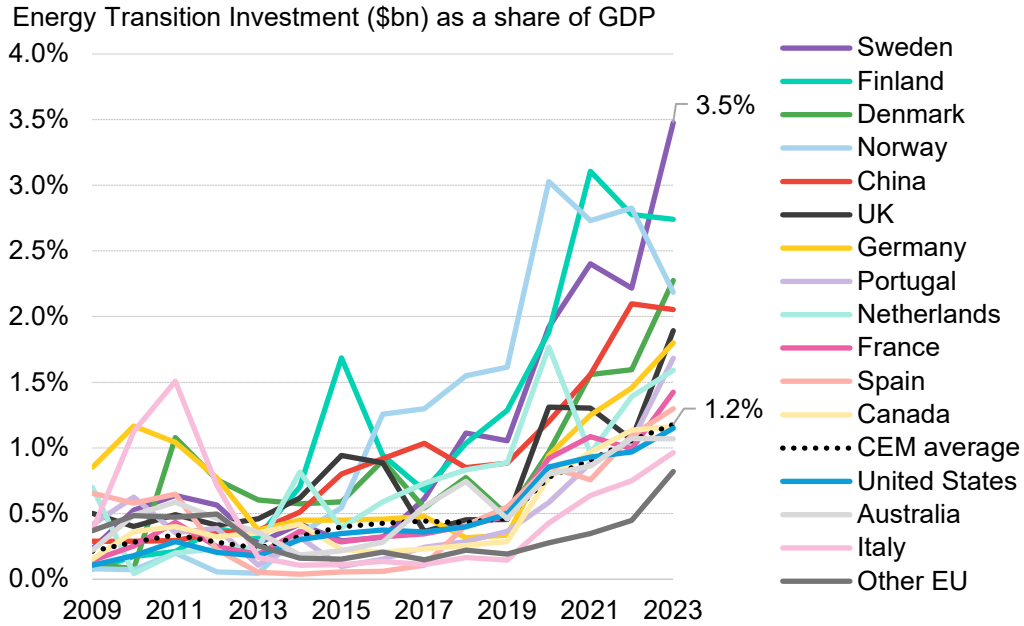
CEM members invested $6.4 trillion in renewable energy and electrified transport in the last 15 years. This represents 92% of global investment in both sectors, and three-quarters of the $8.3 trillion invested by CEM members in the energy transition write large.

Renewable energy alone accounts for $4.5 trillion, or 54%, of the investment over 2009-2023. Yet global adoption of electric vehicles means electrified transport is now giving renewables a run for their money. Investment in the sector grew 32% from 2022 to 2023, and is now a hair's breadth behind renewables, which saw 14% growth year-on-year. On the renewables front, declining costs for solar modules and Chinese wind turbines allowed investment to break $600 billion for the first time.

Other sectors have grown an average of 9% over the last three years. Electrified heat, nuclear, energy storage, sustainable materials, carbon capture and storage (CCS), and hydrogen together accounted for 22% of renewable energy investment in the last 15 years.

# CEM members' investment in the energy transition spiked to 1.2% of GDP in 2023

## Energy transition investment per GDP in top CEM markets



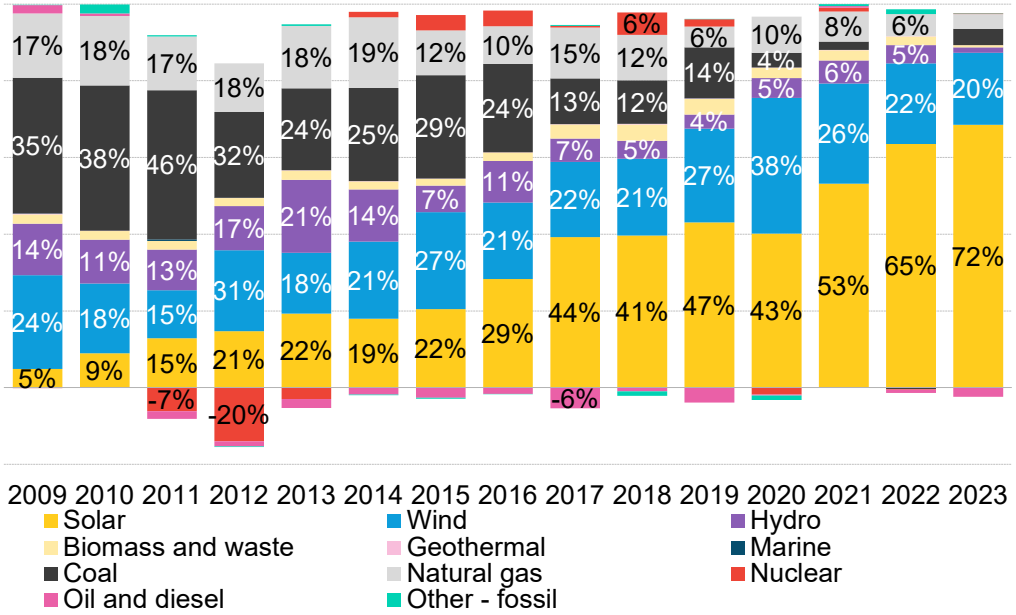

*Source: BloombergNEF, International Monetary Fund (IMF). Note: Chart includes only top 15 CEM members. Start years for Energy Transition investment differ by sector, but all sectors are present from 2020 onwards.*

CEM members committed on average 1.2% of their gross domestic product to energy transition investment in 2023, 1.5 times more than in 2020. The group average passed 1% for the first time just three years ago and is trending ever upward.

Sweden's investment reached a record 3.5% of GDP in 2023, followed by Finland, Denmark and Norway. China rounds out the top five, all of which have now passed the 2.1% mark. The top 10 in this category were all in either Asia or Europe.

# Renewables dominate CEM members' capacity additions

## Share of CEM members' net capacity additions, by technology




Renewables now account for over 95% of CEM members' net capacity additions, up from 46% in 2009. CEM members added a cumulative 2.73 terawatts (TW) of renewables between 2009 and 2023, with a 16% year-on-year average growth rate.

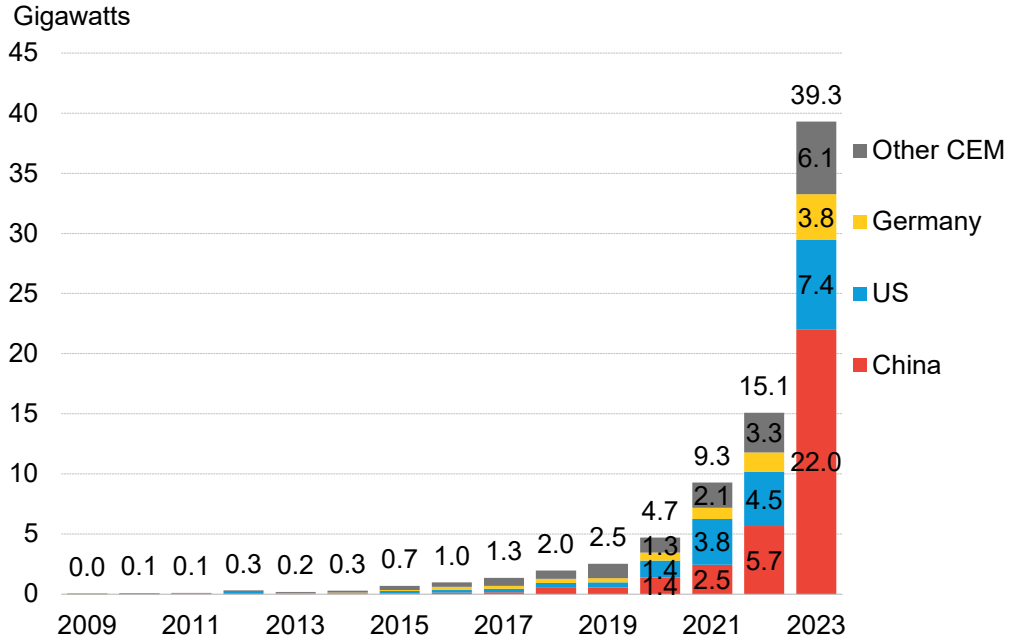
While renewable costs have declined considerably over this period, it was solar that made its mark as the cheaper – and not coincidentally, the most-installed – technology for the last eight years. Solar now boasts a 37% year-on-year average growth rate, while wind grew just 15% per year. In addition, solar growth is not limited to utility-scale projects: both residential and commercial installations have played a big role in its expansion.

Coal had seen a considerable decline since 2020, only to reverse course in 2023. Some 254GW of coal capacity was added in CEM countries, largely because of new plants in China and India.

*Source: BloombergNEF. Note: 'Other – fossil' accounts for plants that use more than one fuel or fuels other than coal, oil and gas. Net capacity additions based on the change in the installed base year-on-year by technology, inclusive of retirements and gross additions.*

# Battery deployment in CEM members more than doubled from 2022 to 2023

## Annual newly commissioned utility-scale battery storage output in CEM members




*Source: BloombergNEF. Note: 'Other CEM' includes other CEM members and the European Union.*

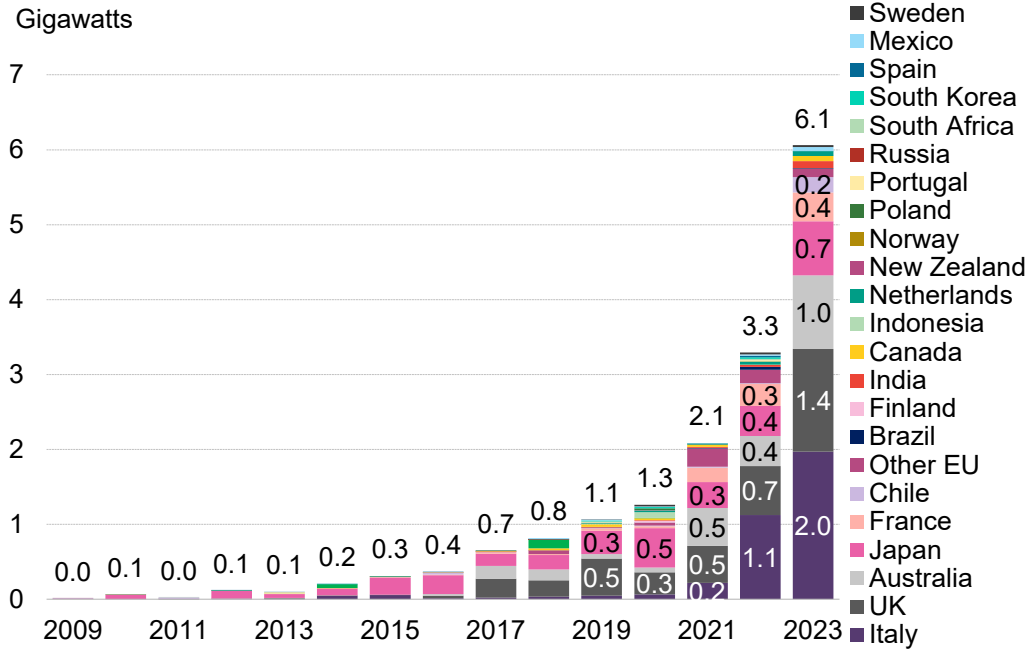
Over 39 gigawatts (GW) of new battery storage capacity was added to CEM members' grids in 2023, an enormous surge from the 15.1GW added in 2022. The rapid growth reflects the importance of storage for global grids, particularly as intermittent renewable energy penetration rates rise. Energy storage is a key enabler for the rise of renewables, as it allows for flexibility by balancing supply and demand and helps ensure grid stability.

China accounted for just over half of the overall market. Installations in China nearly quadrupled from the year prior, to 22GW from 5.7GW.

The US, which was the world's largest demand market in 2021, dropped to second place in 2022 as China surged past. Nonetheless, the US market nearly doubled its installations year-on-year, with 7.4GW added in 2023. Third-place Germany quadrupled its installations in just two years, hitting 3.8GW in 2023, up from 0.9GW in 2021.

# Batteries are being deployed in a growing list of economies

## Annual newly commissioned utility-scale battery storage output in CEM members



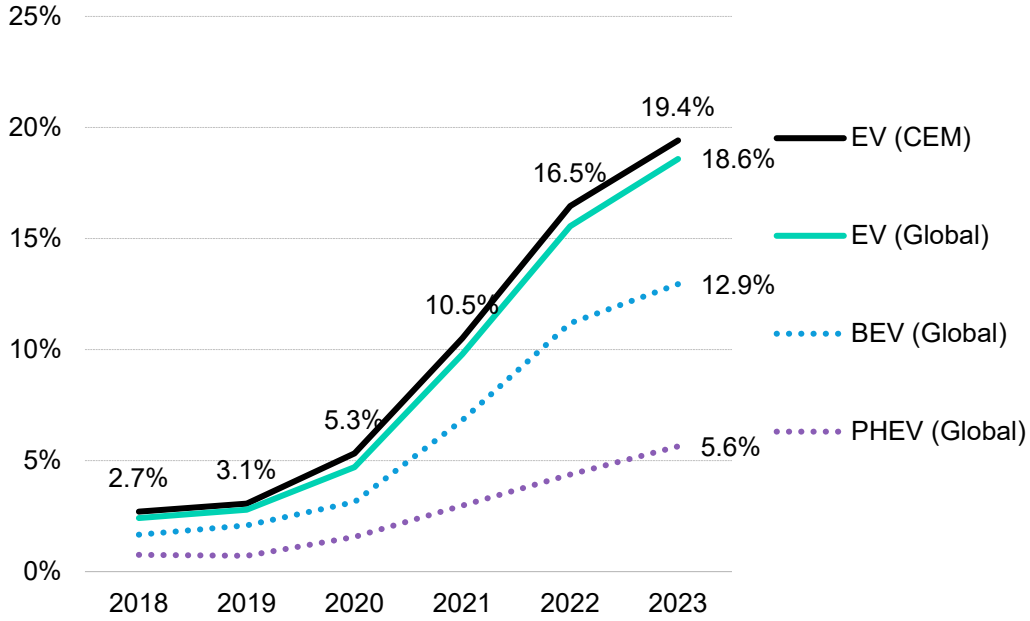

*Source: BloombergNEF. Note: The chart excludes China, the US and Germany.*

Twenty-one CEM members installed at least 1 megawatt (MW) of power-storage capacity in 2023. A growing number of countries are finding use for large-scale batteries on the grid. Key drivers of growth have included the need for greater grid flexibility as variable renewable generation grows, and new policy supports.

On a capacity basis, China, the US and Germany accounted for 85% of all storage installed in 2023. However, total capacity installed in other CEM members doubled last year, to 6.6GW. Italy and the UK saw the biggest installations in this group: Italy installed nearly 2GW last year, while the UK doubled its installations year-on-year to hit 1.37GW. Australia followed, installing just shy of 1GW, and Japan reached 0.72GW. All these markets have observed a considerable growth of renewables capacity over the last 15 years, boosted in no small part by energy storage incentives.

# Approximately one in five cars sold in CEM members today can charge from a plug

## Global and CEM members' electric vehicle sales as a share of total car sales




Approximately 18.6% of automobiles sold globally in 2023 could plug into the power grid. One in eight, or 13%, were pure battery-electric vehicles (BEVs), while one in 18, or 5.6%, were plug-in hybrid electrics (PHEVs). In all, 13.3 million electric vehicles were sold in 2023, up 31% from 2022.

CEM members slightly beat this global trend, with EVs accounting for 19.4% of autos sold in these markets last year.

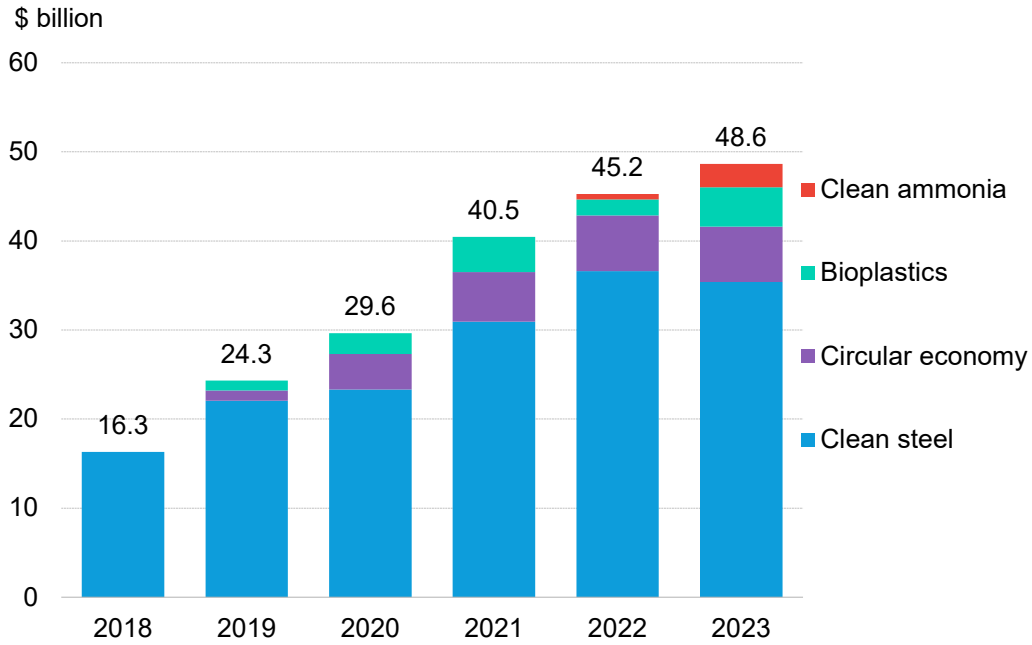
In general, BEVs sell at more than twice the rate of PHEVs, which have a higher upfront cost. Yet while just 5.9% of vehicles sold globally last year were PHEVs, the CEM average was slightly higher, at 6.4%. For both groups, BEVs were around 13% of sales.

CEM Members have seen an average 50% year-on-year growth rate in the share of electric vehicles sales since 2018, in line with the global average growth rate of 54%.

*Source: BloombergNEF, Marklines, Jato, Bloomberg Intelligence. Note: CEM member data does not cover Russia, Saudi Arabia, South Africa and the UAE. 'EV' encompasses both battery-electric vehicles (BEV) and plug-in hybrid electric vehicles (PHEV).*

# Global investment in clean industry has tripled between 2018 and 2023

## Global investment in clean industry, by sector




*Source: BloombergNEF.*

Annual investment in clean industry – which includes clean steel, circular economy, bioplastics and clean ammonia – rose 7% year-on-year to nearly $49 billion in 2023.

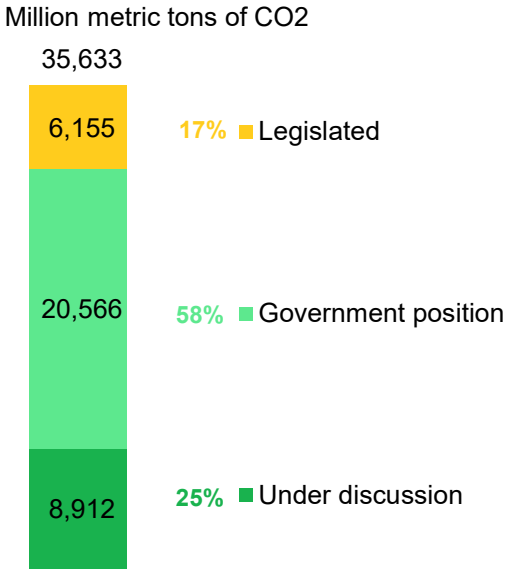
Steel projects have long been the heavy-hitters in this group, bringing in $35 billion in 2023, or 73% of the sector's investment, with electric arc furnaces (EAFs) accounting for nearly three-quarters of this figure.

Yet steel's mighty market share represents a considerable drop from the near-total grip it had on the market just five years ago, as other up-and-coming sectors gain traction. Circular economy, bioplastics and clean ammonia, respectively represented 13%, 9% and 5% of clean industry investments in 2023. Investments have tripled from 2018, jumping from $16.3 billion in 2018 to $48.6 billion in 2023.

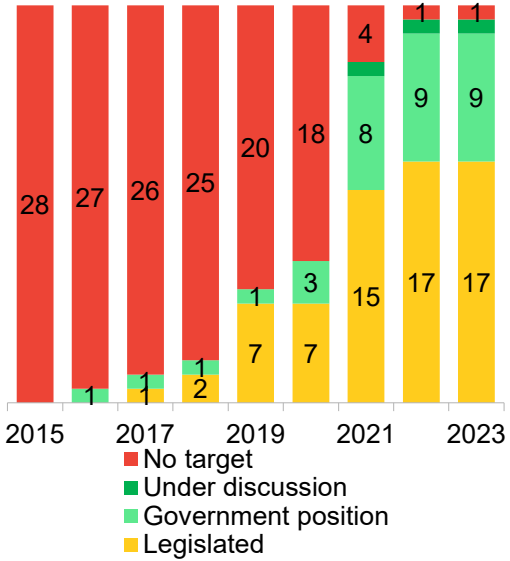
Worldwide, investment momentum remains strong, with about $7.4 billion committed to major steel, aluminum and cement decarbonization projects in the first four months of 2024.

# CEM members' net-zero pledges cover three-quarters of global emissions

## CEM members' emissions covered by net-zero targets




## Count of individual CEM member pledges



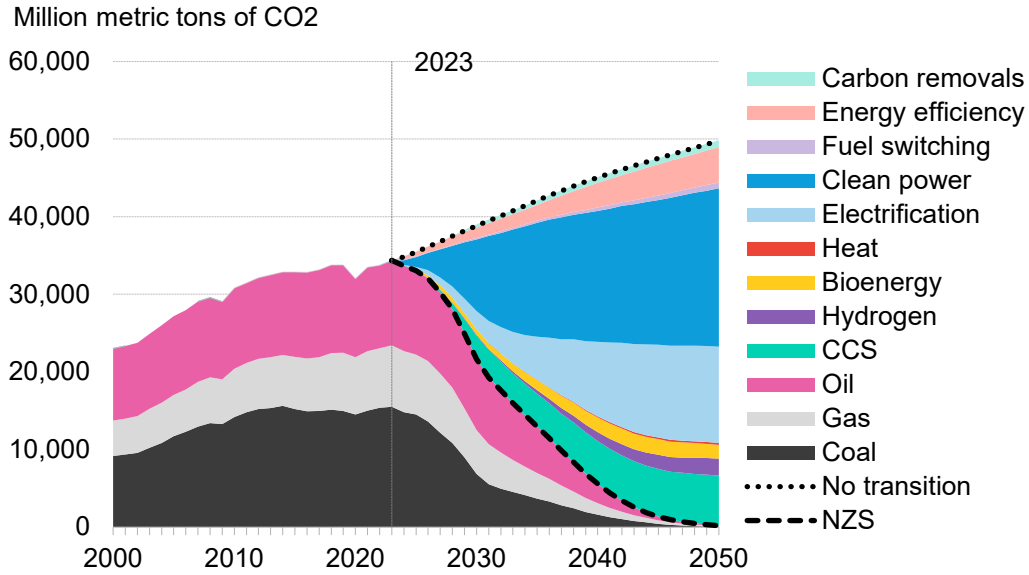

CEM members have made long-term pledges to reach net-zero emissions that cover 76% of global emissions, or 35,632 million metric tons of CO2. Over 60% of CEM members have legislated net-zero targets, while 32% have a stated governmental pledge.

These net-zero targets represent rapid action among CEM markets. In under eight years, nearly all CEM members have now stated or legislated net-zero pledges. Only Mexico has yet to set a net-zero legislation or pledge.

*Source: BloombergNEF, World Resources Institute Climate Watch (WRI CAIT). Note: Pledges as of July 2024. Uses 2021 data as baseline emissions. 'No target' includes targets under discussion. Does not include European Commission members. Government positions include government stated targets that have yet to be legislated.*

# The window to reach net-zero emissions by 2050 is closing, but there is still time

## CO2 emissions reductions, BNEF's Net Zero Scenario versus no-transition scenario




The energy transition has accelerated considerably, with record levels of both technology deployment and capital investment. While emissions are staying stubbornly high, BNEF sees carbon neutrality by mid-century as a tough but achievable goal. Yet this decade could be the decisive moment on whether net-zero targets can be achieved.

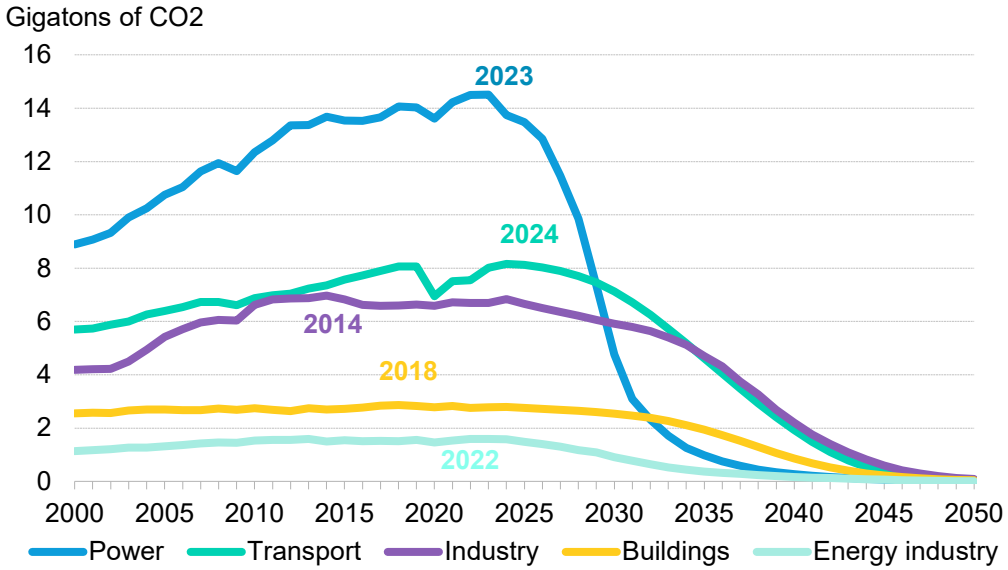
Cleaner power generation can drive the bulk of the aggressive emission cuts needed this side of 2030, according to BloombergNEF's New Energy Outlook which presents long-term energy and climate scenarios for the transition to a low-carbon economy. Stepping forward to cleaner power sources also can enable more time to tackle 'hard-to-abate' areas where cost-competitive solutions have yet to scale.

Clean power, electrification, bioenergy, hydrogen, and CCS are key technology solutions that can allow the world to reach net zero. They are also vital to the decarbonization strategies of the three sectors covered in this report: power, transport and industry.

*Source: BloombergNEF. Note: The 'no-transition' scenario is a hypothetical counterfactual that models no further improvement in decarbonization and energy efficiency. In power and transport, it assumes that the future fuel mix does not evolve from 2023 (2027 in shipping).'Clean power' includes renewables and nuclear, and excludes carbon capture and storage (CCS), hydrogen and bioenergy, which are allocated to their respective categories. 'Energy efficiency' includes demand-side efficiency gains and more recycling in industry.*

# Major efforts will be needed to decarbonize power, transport and industry

## Greenhouse gas emissions, by sector and projected peak year, under BNEF's NZS




*Source: BloombergNEF. Note: Labels show year of peak emissions. 'Other' includes agriculture, forestry, fishing, the energy industry's own energy consumption, and other final energy consumption that is not further specified. The Net Zero Scenario (NZS) describes an economics-led evolution of the energy economy to stay within a carbon-emissions constraint and achieve net-zero emissions in 2050, with no overshoot or reliance on net-negative emissions after 2050.*

BloombergNEF has modeled multiple scenarios for how the energy transition may unfold over the next three decades. Under the Net Zero Scenario (NZS), which lays out a pathway to keep global warming to 1.75C, global emissions must start falling immediately.

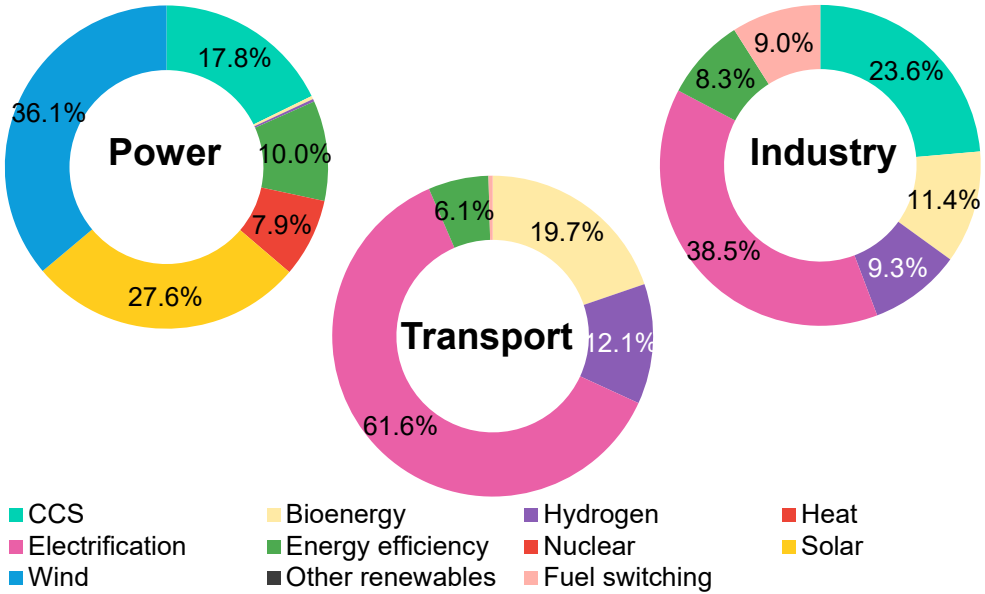
Emissions in the power sector see the most immediate decline. Power-sector emissions peak at 14.7GtCO2 in 2023. By the early 2040s the sector is effectively carbon-neutral.

Both power and road-transport sectors have the most mature technology solutions and need to transition fastest. To reach sector-specific carbon budgets, energy-related carbon emissions need to fall rapidly.

Emissions in hard-to-abate sectors such as industry, aviation and shipping take longer to reduce emissions. Other sectors, such as buildings, have emerging technology solutions, but these are still hard to implement.

# A collection of solutions are needed to reach net zero by 2050

## Emissions abatement, by solution, from 2024 to 2050 under BNEF's NZS




The energy transition will require a multitude of technologies and solutions. The top technologies covered un this report are clean power, electrification, bioenergy, hydrogen and CCS, all of which are key to decarbonizing power, transport and industry.

No single solution alone can be responsible for reducing emissions. Yet regardless of whether the world hits net zero, the era of fossil fuels' dominance needs come to an end, as clean power is the single biggest player in emissions abatement. Even if the transition is propelled by economics alone, with no further policy drivers to help, renewables could still cross a 50% share of electricity generation at the end of this decade.

*Source: BloombergNEF. Note: Does not consider carbon removals. Based on BNEF's Net Zero Scenario. 'CCS' refers to carbon capture and storage.*

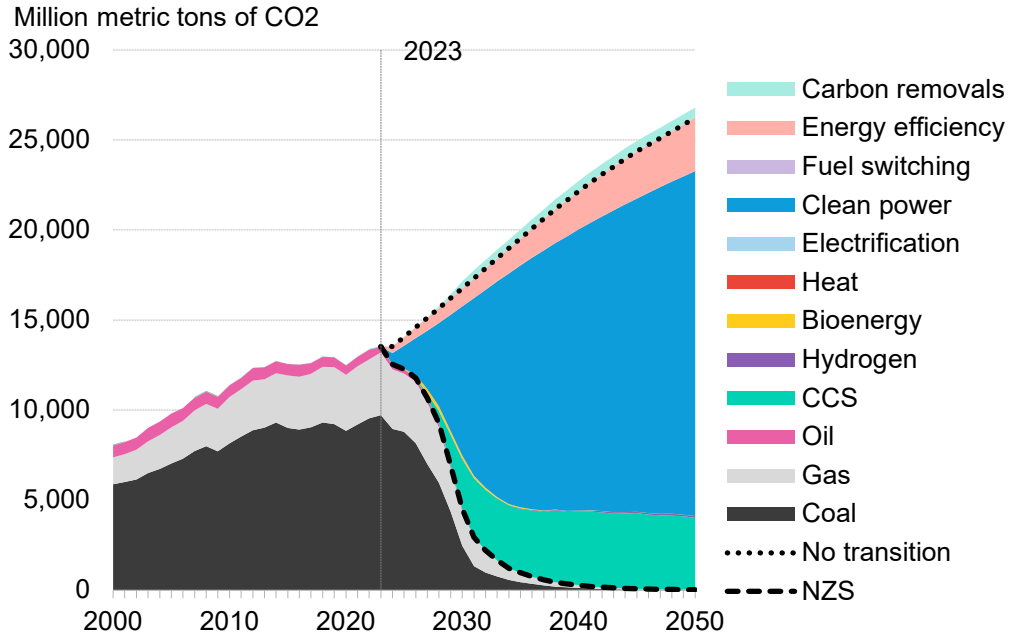
# Power sector

15 years of CEM | **Power** | Transport | Industry | Investment

BloombergNEF

# Global emissions in the power sector must drop immediately to reach net zero

## Power sector CO2 emissions reductions, NZS versus no transition scenario



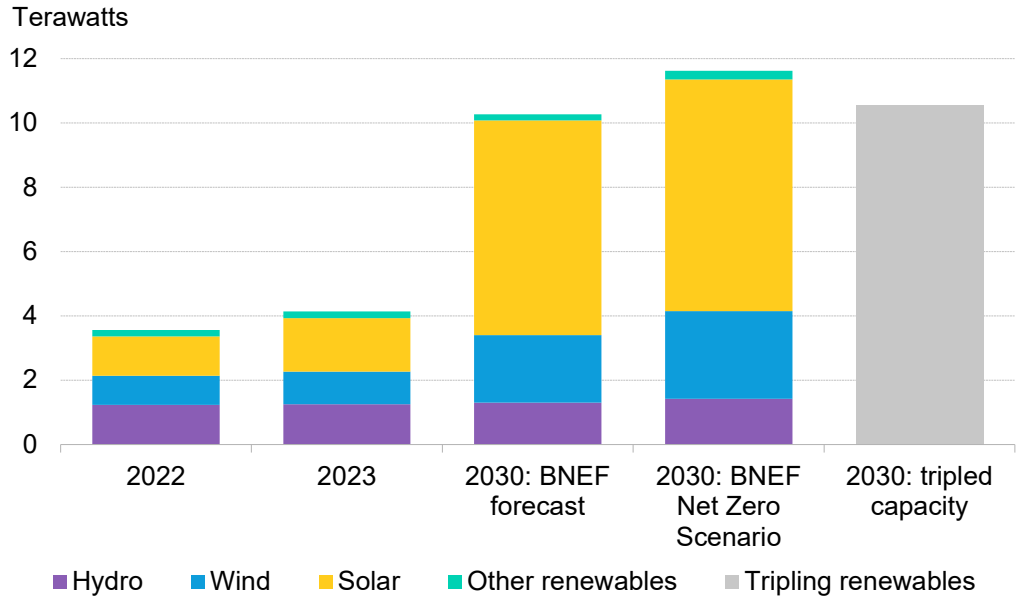

*Source: BloombergNEF. Note: 'CCS' refers to carbon capture and storage.*

The workhorses of power-sector decarbonization in the NZS are wind and solar, enabled by technology solutions for flexible supply and demand. To measure their contribution to decarbonization, BNEF considers a hypothetical 'no-transition' scenario where power demand continues to grow but the carbon intensity remains the same as today. Against this counterfactual, wind and solar contribute 64% of the emissions abatement in the NZS.

CCS and nuclear are critical enablers for variable renewables thanks to their ability to deliver clean, dispatchable energy. They abate 18% and 8% of emissions, respectively, versus a 'no-transition' scenario. Energy efficiency, which measures avoided demand through demand-side energy efficiency measures, shoulders another 10%. Meanwhile, hydrogen and other renewable technologies, such as hydro and geothermal, play only a niche or regional role due to their high cost or localized availability. Biofuels and hydrogen also play a key part in decarbonizing aviation and shipping sectors.

# Tripling renewables by 2030 will be hard, but achievable

## Global installed renewables capacity in 2022 and 2023, and in three scenarios for 2030




A net-zero pathway hinges on renewables capacity tripling to over 11 terawatts between now and the end of the decade. As these renewables decarbonize the global power mix, they are responsible for over 50% of emissions reductions this decade, according to the NZS.

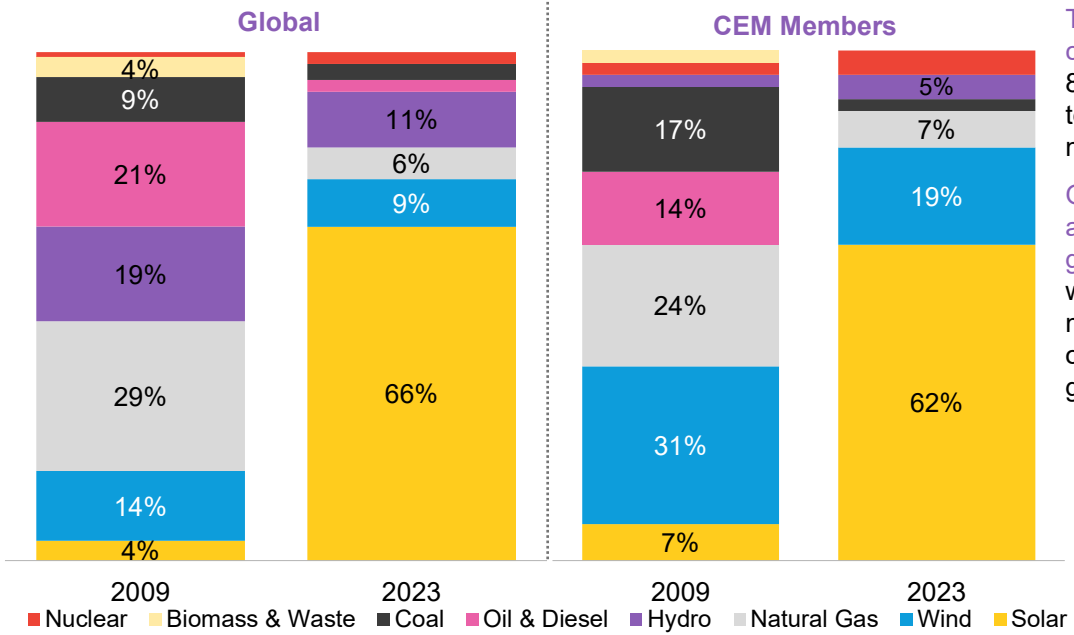
Some regions need more support and investment than others. China and Brazil are broadly on track for a net-zero future. Europe, the US and India have strong policy support for the energy transition but need to pick up. Japan, Indonesia, the Middle East, North Africa, Turkey and sub-Saharan Africa are lagging well behind in both volume of deployment and investment.

Scaling up the right mix of technologies matters. A diverse portfolio of renewable energy sources is ideal for decarbonizing the global power system.

*Source: BloombergNEF. Note: 'Other renewables' includes bioenergy, geothermal, solar thermal and marine.*

# Renewables are the top choice in a growing number of markets

## Most-popular new power-generating technology installed in 2023



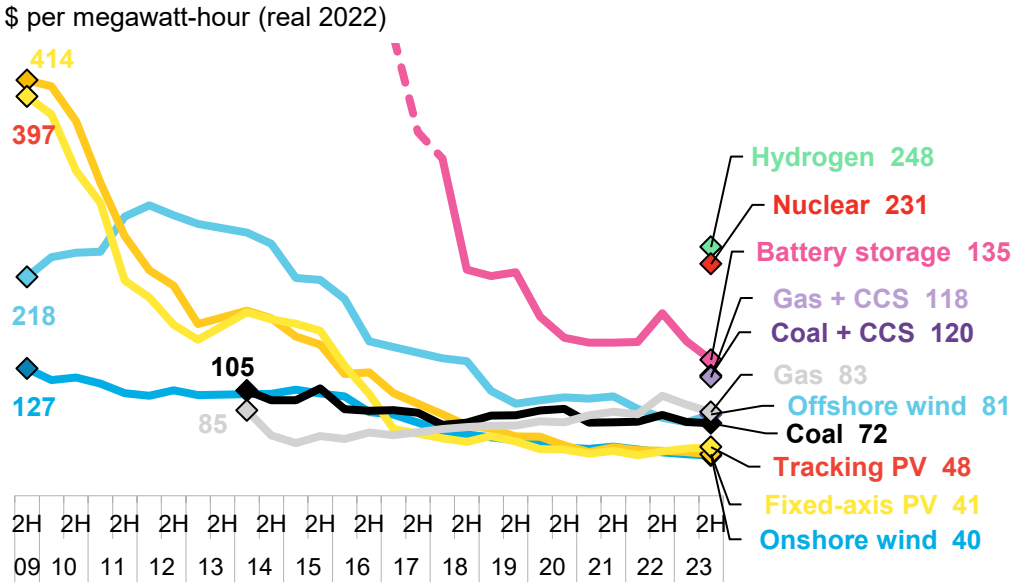

The number of markets that are installing more renewable capacity than fossil-fuel capacity keeps rising. In 2023, 83% of the world's economies had a renewable energy technology (including hydro) as their primary installation, more than double the 40% in 2009.

Over 85% of CEM members had either solar, wind or hydro as their top technology added in 2023, consistent with the global trend. Globally, non-renewable capacity additions were still the top choice in 16% of markets. Among CEM members, Canada, Indonesia and Saudi Arabia were the only countries in which a fossil fuel – in all cases natural gas – was the most-added technology.

*Source: BloombergNEF. Note: Depicts the percentage of markets that installed the most megawatts of each technology. Based on market-level data for 140 markets but excludes markets that have not recorded any capacity additions. Solar includes small-scale photovoltaic (PV).*

# Onshore wind and solar is already cheaper than fossil fuels

## Global levelized costs of electricity benchmarks




Onshore wind and solar remain the cheapest new-build technologies for producing electricity, a position held since 2018. Yet onshore wind and solar cost declines have slowed – and even temporarily reversed in some cases – as the technology matures and as costs for materials, shipping and financing rise.

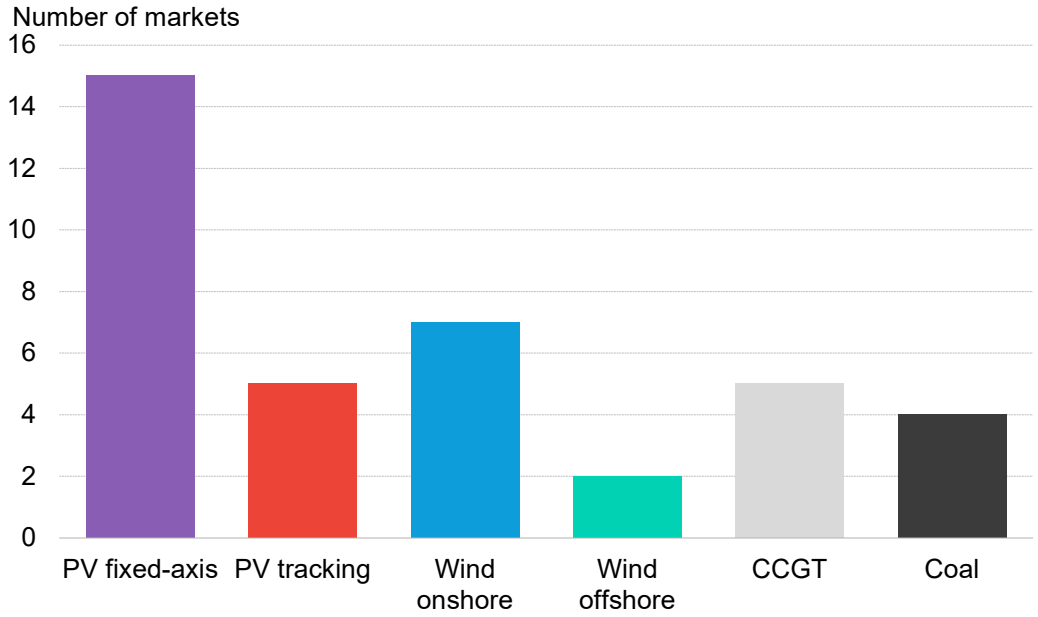
Installing turbines out at sea comes at a premium. Offshore wind costs $81 per megawatt-hour (MWh), double that of onshore wind. BNEF expects levelized costs of electricity (LCOEs) for offshore wind to continue to fall as the technology develops.

Low-carbon dispatchable technologies, such as CC,S nuclear and hydrogen, are needed to decarbonize the power sector. Coal and gas with CCS cost $120/MWh and $118/MWh, respectively. A combined-cycle plant burning hydrogen costs $248/MWh, and nuclear generation costs $231/MWh on average.

*Source: BloombergNEF. Note: The global benchmarks are capacity-weighted averages using the latest country estimates – apart from nuclear, hydrogen and carbon capture and storage (CCS), which are simple averages. Offshore wind includes offshore transmission costs. Coal- and gas-fired power include carbon pricing where policies are already active. Levelized costs of electricity (LCOEs) do not include subsidies or tax-credits. LCOEs shown by financing date. 'PV' stands for photovoltaic solar.*

# Renewables are the cheapest power source in two-thirds of the world

## Market count for cheapest source of new bulk generation ($/megawatt-hour, levelized)



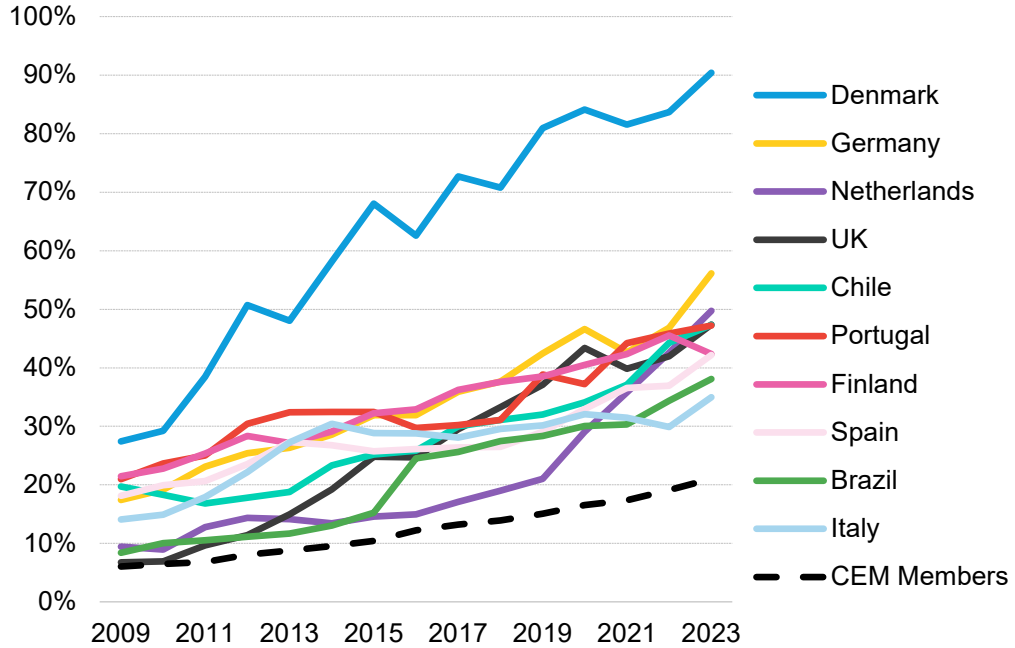

Either wind or solar is the cheapest source of new bulk electricity generation in countries accounting for 59% of power supply – down significantly from 82% in 1H 2023. Fossil-fuel assets have undercut renewables in the US and Japan – two of the top five countries (alongside Russia, China and India) in terms of electricity use.

China and India, on the other hand, deliver renewables at some of the lowest cost worldwide. China is home to the cheapest onshore wind ($33/MWh) and offshore wind ($63/MWh), thanks to its manufacturing capabilities. The $39/MWh cost of fixed-axis solar photovoltaic (PV) in China is only second to India's, at $34/MWh.

*Source: BloombergNEF. Note: The map shows the technology with the lowest levelized cost of electricity (LCOE) or auction bid for recent delivery for new-build plants in each market where BNEF has data. LCOEs exclude subsidies, tax credits and grid connection costs, and include a carbon price where applicable. 'CCGT' refers to combined cycle gas turbine. Data as of 2H 2023.*

# Renewables are making unprecedented contributions to national grids

## Top 10 CEM Members for share of renewables in total energy generation



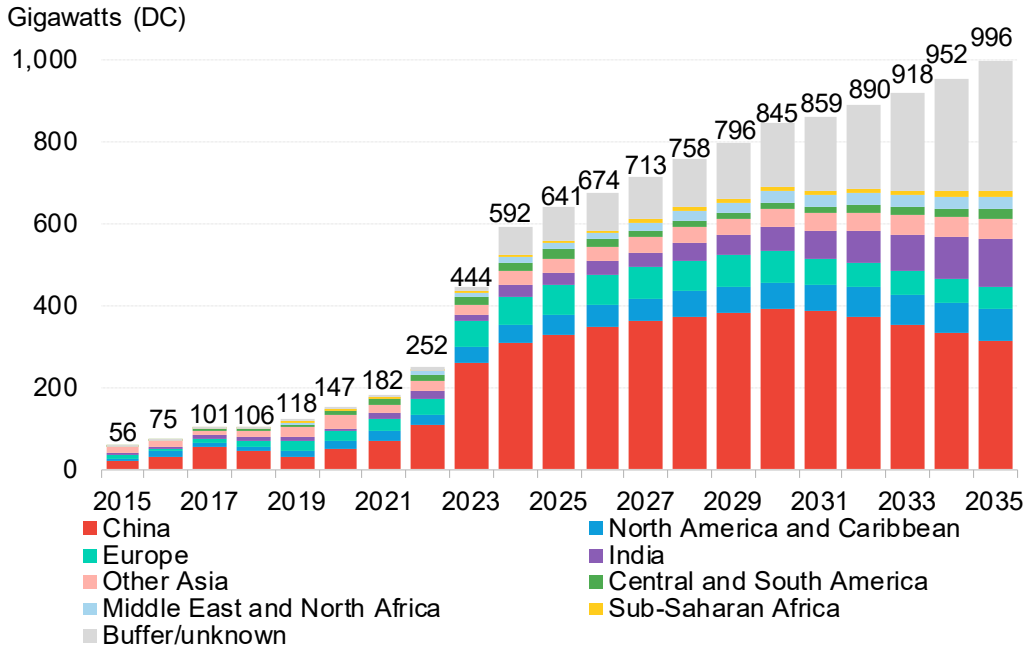

*Source: BloombergNEF.*

As wind and solar capacity additions continue to grow, so too do their contributions to power grids. In 2023, 10 CEM members satisfied over 40% of their electricity demand with wind and solar power. Denmark has long been the global leader in this respect, reaching 90% of its total generation from renewables (including hydro) in 2023. Overall, CEM members have seen a 9% average year-on-year growth rate of renewables penetration since 2009.

Denmark has experienced considerable growth since 2009, with a 10% year-on-year average growth rate in renewable penetration. Wind, biomass and solar have been the key drivers, together accounting for over 90% of renewable energy generation in the country in 2023.

# Solar keeps hitting records

## Solar PV installations, historical and forecast




*Source: BloombergNEF. Note: Capacity shown in direct current (DC), which is module capacity. 'PV' refers to solar photovoltaic.*

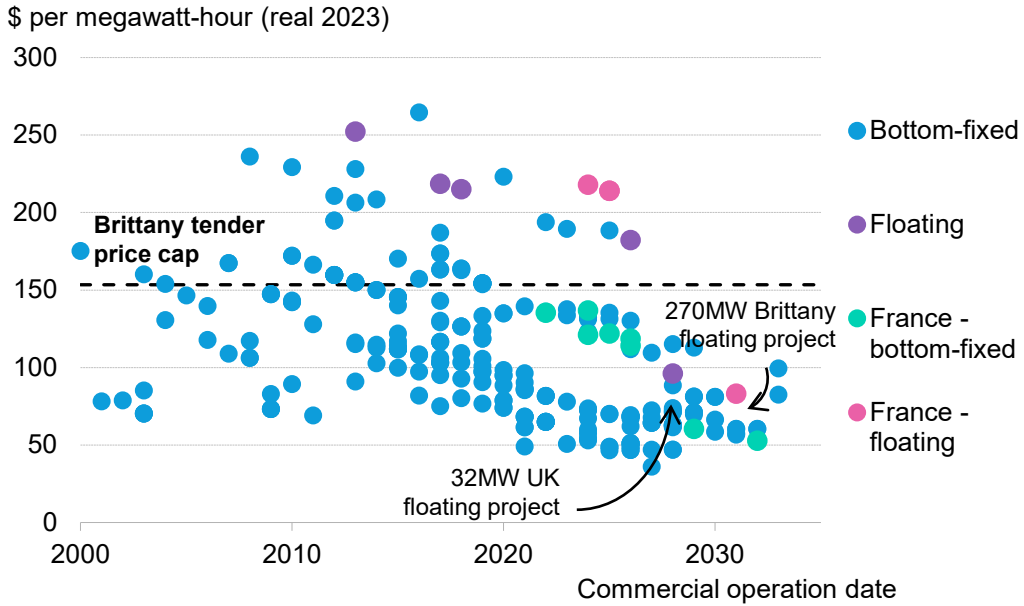
The PV industry added about 444GW of new capacity worldwide in 2023, up 76% from 2022, and 2024 is expected to top 592GW. Low prices for modules are stimulating demand in new markets, but hurting manufacturers, who are competing intensely to maintain market share.

Enough polysilicon could be produced by major suppliers to make 900GW of modules this year. Some polysilicon makers have already halted production on low prices; others are likely to follow.

Governments continue to plan to support local manufacturers and build local solar industries, but the intense cost pressure will make companies wary of investing unless incentives are extremely generous. Many announced plans for factories in Europe, the US and other countries are likely to be be canceled.

# World's first commercial-scale floating wind tender award is optimistically cheap

## Levelized offshore wind prices, by foundation type



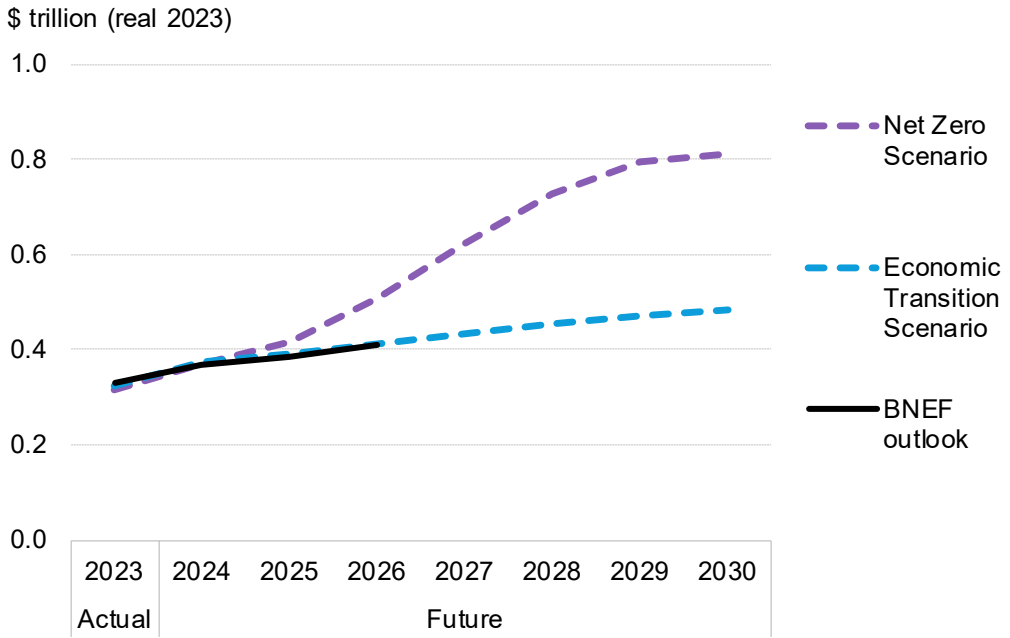

France has awarded a revenue contract for a 270MW project off the coast of Brittany in the world's first commercial-scale floating wind tender. The wide range of bids and financial assumptions reflect the uncertainty that persists in the floating wind sector. The rock-bottom winning bid, optimistic capex assumptions, massive turbines and tight timeline all point to additional risks to the realization of the wind farm.

Floating offshore wind is pricier and more nascent than bottom-fixed projects, making up less than 1% of cumulative capacity today. The world was watching the Brittany tender to see where prices for one of the first major projects would fall. This wind farm's fate will be crucial in bolstering or dimming confidence in the floating wind market.

*Source: BloombergNEF. Note: To levelize prices, we considered tariff price and length, inflation, a merchant tail assumption and a 25-year project lifetime. It is the average tariff over the full life of the project. For a project's merchant tail and zero-subsidy projects, we assume that the previous five-year average power price (excluding 2022) stays flat in real terms.*

# Net zero will require at least $21 trillion in grid investment by 2050

## Global annual grid investment outlook versus BNEF's NZS and ETS



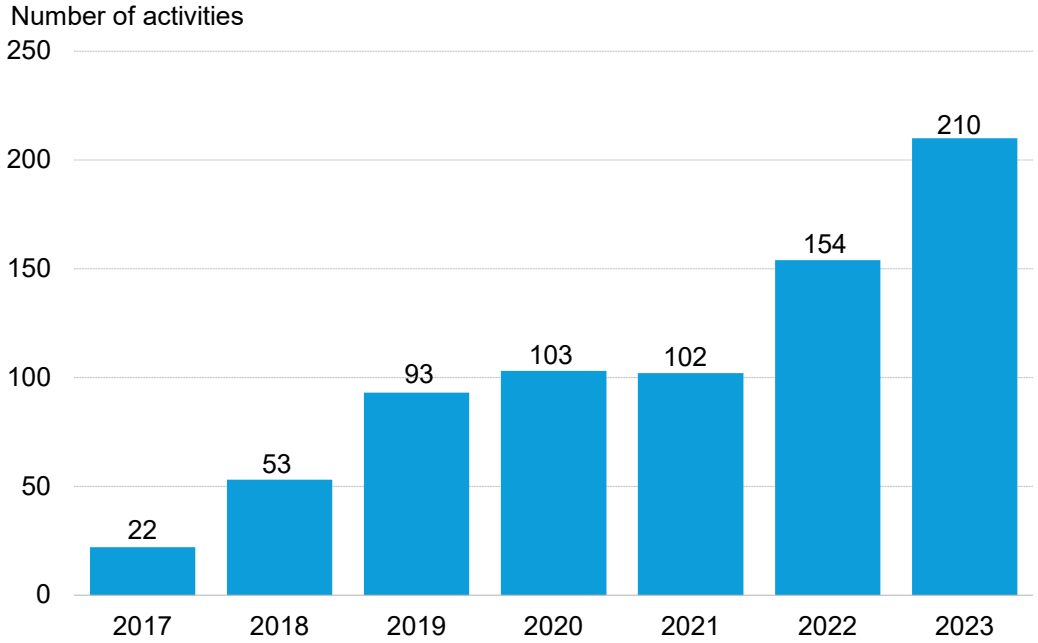

BNEF's outlook for grid investment roughly aligns with the base-case scenario in the *New Energy Outlook*. This Economic Transition Scenario, which assumes an economics-led transition and no further support for clean technologies beyond existing measures, sees an annual average of $392 billion invested over 2024-26. That's only slightly less than the $388 billion invested each year in BNEF's outlook, or what it considers likely. In the 10 markets where BNEF tracks grid investment plans, spending falls short of ETS-modeled needs by just 2%

However, there is a stark difference between BNEF's grid investment outlook and a global net-zero pathway. The NZS requires a doubling of global annual grid spend by 2030. This investment ramps up over time, with an average annual investment of $432 billion over 2024-26 – already 10% more than in BNEF's outlook – and rising to an average of $738 billion a year for 2027-2030.

*Source: BloombergNEF, company reports and regulatory filings. Note: Includes spending on transmission and distribution networks.*

# Utilities are integrating digitalization into their operations

## Digitalization projects and partnerships in the power sector




BNEF tracked a record 210 new activities started and partnerships formed by utilities, oil, gas and other energy companies in the energy sector in 2023. This suggests that utilities increasingly see digitalization as a way to create long-term value and are moving beyond pilots and projects to scale technologies. Connectivity, analytics software and cloud/data had the largest project counts.

*Source: BloombergNEF. Note: Initiatives include analytics software, automation, cloud/data, communications, connectivity and internet-of-things software.*

# Transport sector

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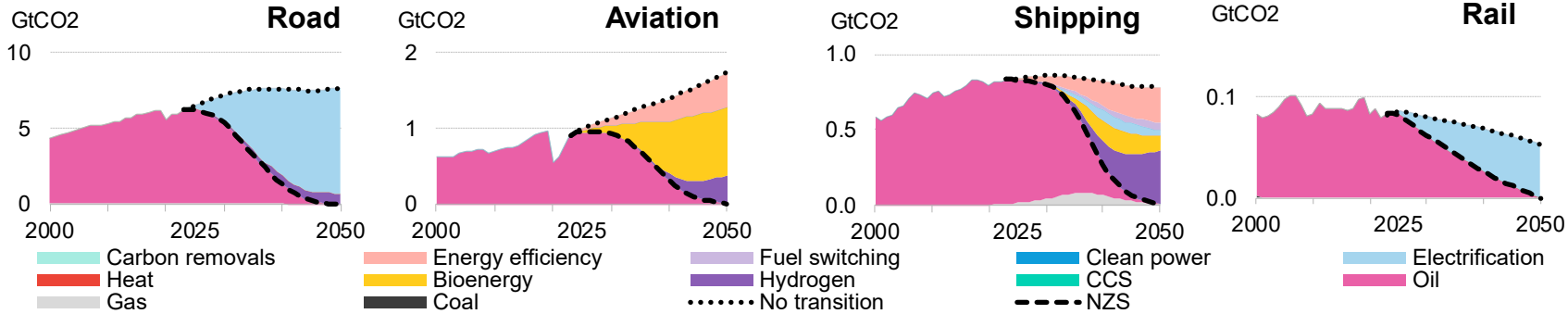
# Electrification via batteries is the most viable route to decarbonize road transport

Direct electrification via batteries is the most efficient, cost-effective and commercially viable route to decarbonize road transport. While electric vehicles are making progress, decades will be needed to replace internal combustion engine (ICE) vehicles that continue to be sold, especially in emerging markets.

By 2050, EVs could consume 14% of power globally, up from 1% in 2023. Oil demand in the road sector reaches its peak of about 2.1 billion metric tons of oil equivalent in 2027, before declining 56% in 2050 – a drop roughly double the amount of oil consumed by the aviation, shipping and rail sectors combined in 2023.

The reason behind the drop is not lack of demand for mobility. Globally, passengers travel 40 trillion kilometers by 2050 – up from 26 trillion kilometers in 2023 – while freight demand from trucks increases to 8 trillion freight ton-kilometers from 4.6 trillion. Instead, electrification of transport brings massive energy conversion efficiencies, while the rise of shared and autonomous vehicles in coming decades drives additional energy savings from avoided demand

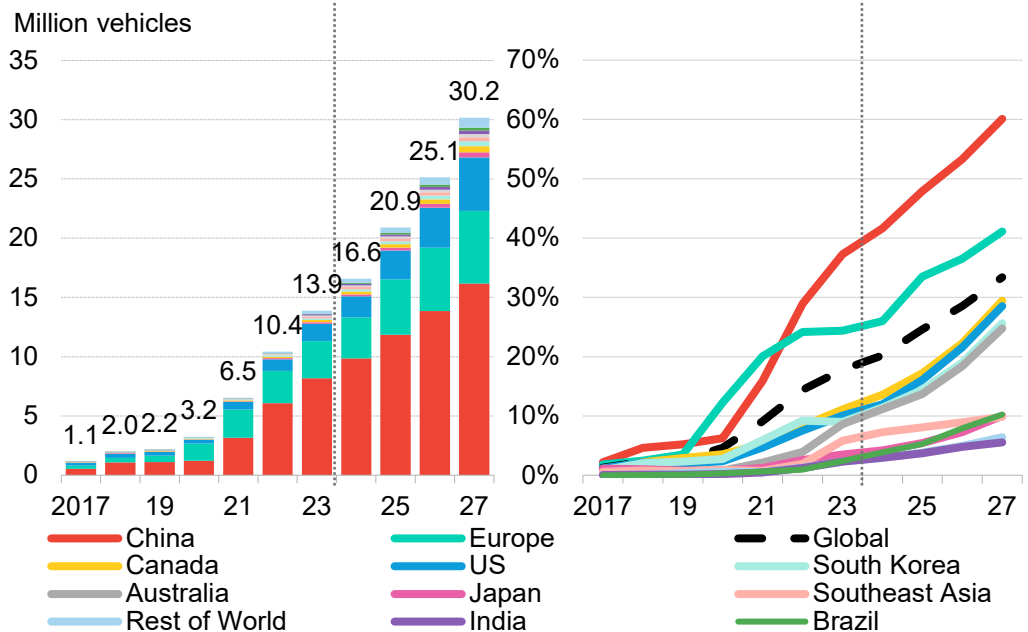
## Transport CO2 emissions reductions, NZS versus no-transition scenario




*Source: BloombergNEF. Note: GtCO2 refers to gigatons of CO2. 'NZS' is BNEF's Net Zero Scenario, and 'CCS' is carbon capture and storage.*

# Yearly EV sales could hit 30 million units worldwide in the next few years

## Global near-term passenger EV sales and share of new passenger vehicle sales, by market




*Source: BloombergNEF. Note: Europe includes the EU, the UK and European Free Trade Association (EFTA) countries. EVs here includes battery-electric and plug-in hybrid vehicles. 2023-2026 are BNEF forecasts.*

Global passenger EV sales will keep growing over the next few years. EV sales rose to 13.9 million in 2023 and are expected to reach 30 million in 2027 in BNEF's base-case scenario.

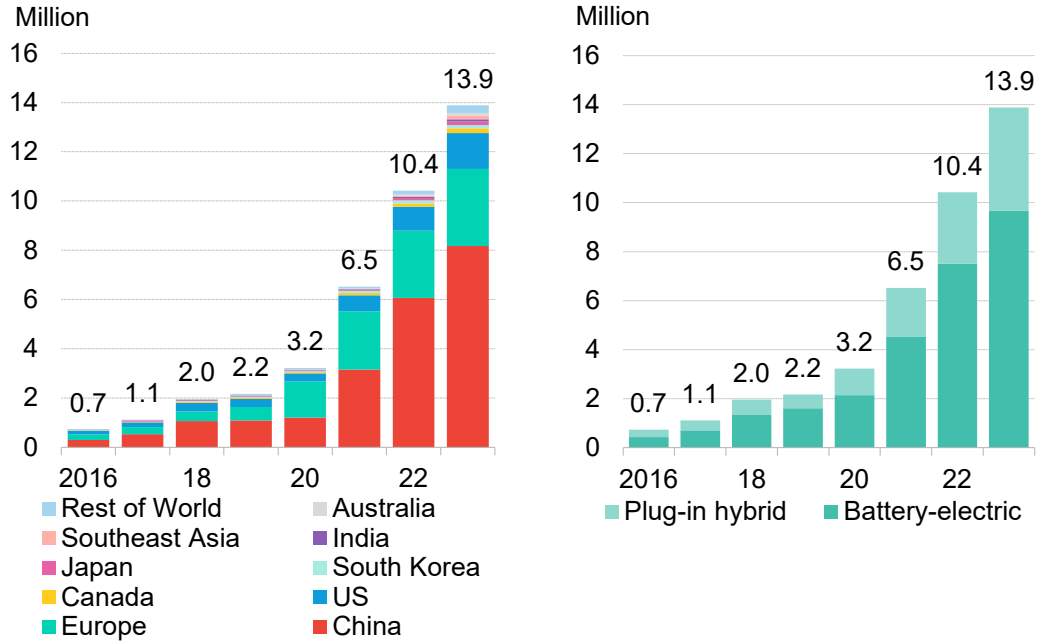
Yet this impressive increase also comes with a slowdown in growth rates, as the industry turns from early-adopters toward the mass market. Over the next four years, EV sales grow at an average of 21% per year, compared with an average of 61% between 2020 and 2023.

Globally, EVs are on track to account for a third of new passenger vehicle sold in 2027, up from just over a sixth in 2023. China, where EV share of sales could hit 60%, and Europe, with 41%, are the only markets above the global average by then.

Still, the underlying technology for EVs continues to get better and cheaper, with many new lower-cost EV models set for launch in the next few years. Some of the fastest growth rates are in emerging markets, with EV sales set to quintuple in Brazil and triple in India by 2027 .

# Some countries have already achieved mass-market adoption of EVs

## New EV sales, by market/region and drivetrain







*Source: BloombergNEF, Marklines.*

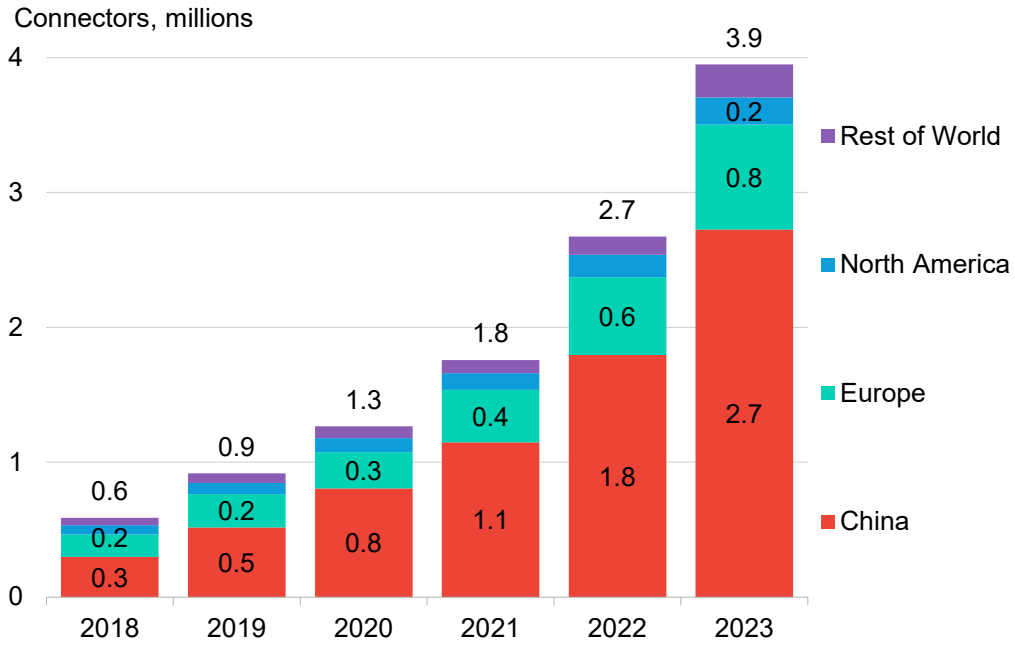
With over half of global EV sales last year, China is the clear market leader. Europe and the US are a distant second and third place.

Battery electric vehicles represented 70% of the plug-in market in 2023, down from 72% in 2022, while plug-in hybrids slightly increased their share of the overall passenger electric vehicle market. The increase in the market share of plug-in hybrids comes from China, where sales of cars with this drivetrain were up 82% year-over-year in 2023. This is attributed to the demand for plug-in hybrids rising quickly outside of megacities where consumers are more price-sensitive and still find it more difficult to access charging infrastructure.

In 2023, in the compact-car segment – which makes up nearly a quarter of total passenger vehicles sales in China – an average fully electric car was still priced roughly 18% higher than a comparable ICE model. The price gap between an average plug-in hybrid car in the same segment and a combustion car was near zero.

# There are more than 2.7 million public EV charging connectors worldwide

## Public EV charging connectors installed

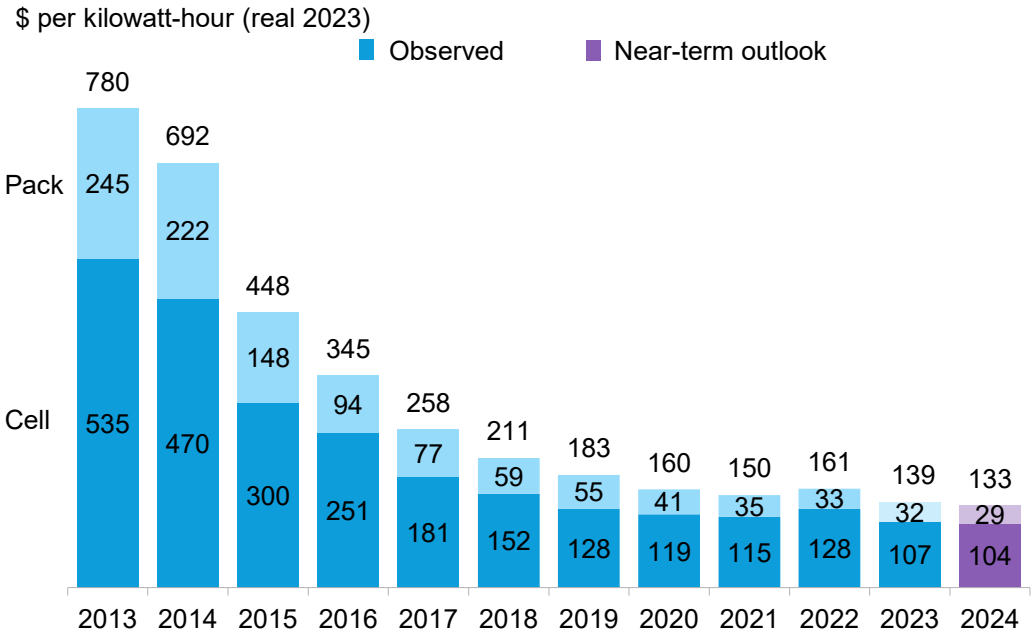



The global public charging network consisted of close to 4 million chargers at the end of 2023, some 40% more than the year before. As it does with EVs writ large, China continued to dominate the global public charging network, with 69% of the total number installed at the end of 2023. The country added 929,000 new chargers last year, for a year-on-year growth rate slightly above the global average.

*Source: BloombergNEF, China Electric Vehicle Infrastructure Promotion Alliance (EVCIPA), US Alternative Fuels Data Center,Tesla, Chargehub, a range of public and private sources.*

# Lithium-ion battery prices are falling again

## Near-term lithium-ion battery cell and pack price forecast



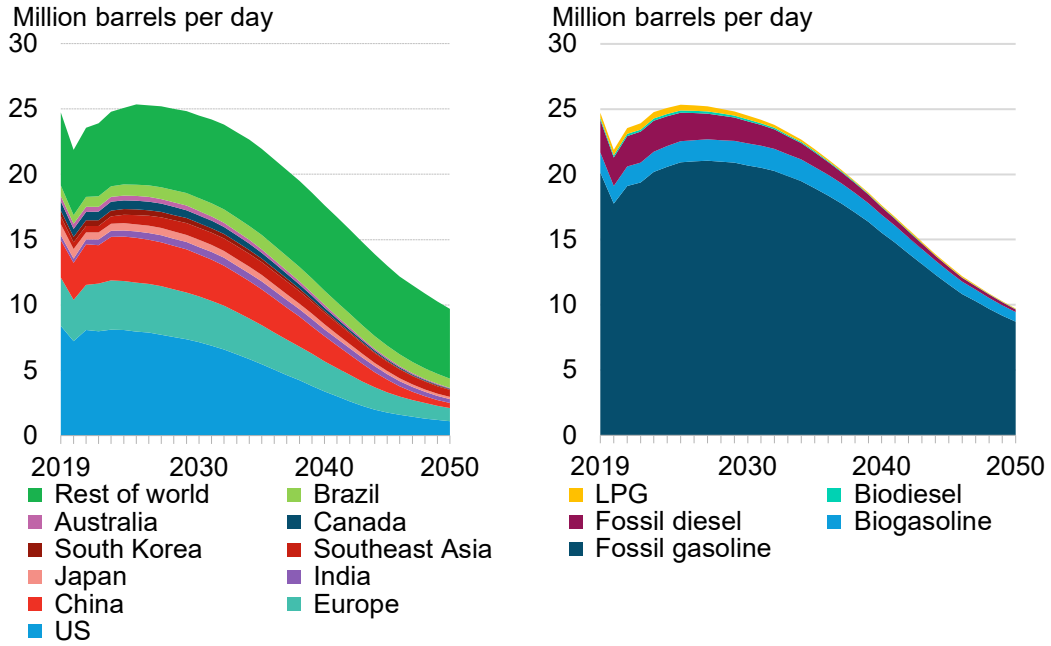

*Source: BloombergNEF.*

Battery prices have started to fall again after briefly ticking upward in 2022. Average battery pack prices came in at $139 per kilowatt-hour (kWh) in 2023, and BNEF expects them to fall another $6/kWh in 2024 based on expected commodity prices. This near-term outlook is based on expected battery metal prices from survey participants in the metals and battery industries.

The drop in battery prices in 2023 was driven by falling raw material and component prices due to significant growth in production capacity across all parts of the battery value chain. Prices for raw materials like lithium, cobalt and nickel have tumbled dramatically over the last 18 months, which is impacting battery costs. The lowest battery cell prices are already just $72/kWh, and next year will likely see record lows on this front as well. Meanwhile, demand may have fallen short of industry expectations, sparking unease in the market.

# Demand for road fuels is nearing its peak

## Road fuel demand outlook for passenger cars, by region and fuel



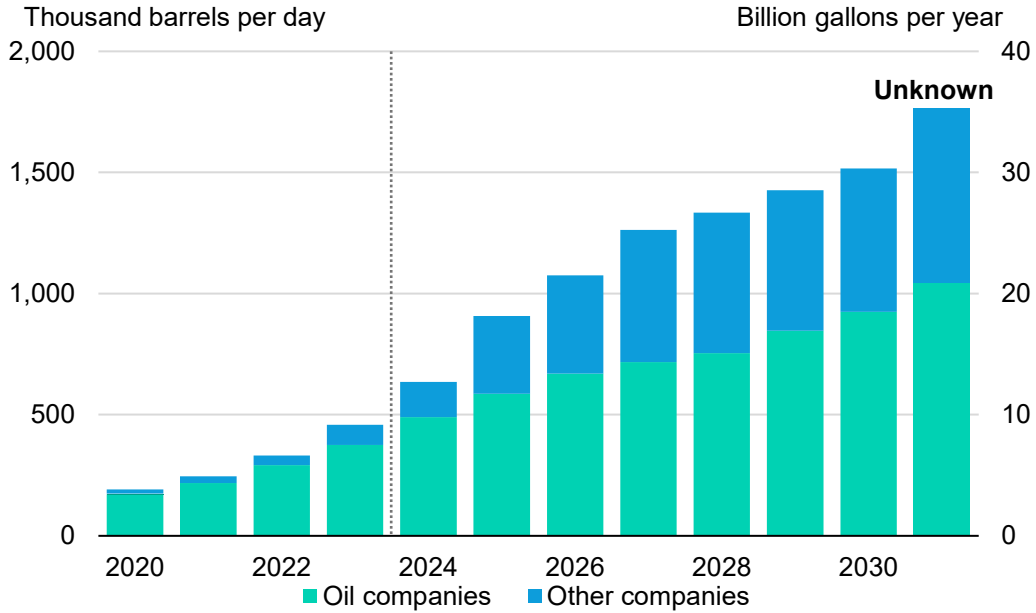

*Source: BloombergNEF's Economic Transition Scenario. Note: Includes biofuels. 'LPG' refers to liquefied petroleum gas.*

The ETS sees road-fuel demand from passenger cars reaching a post-pandemic high of 25.3 million barrels per day in 2025. This decline is attributed to a structural change in mature markets like Europe and the US, and growth in alternative drivetrains in fast-growing markets like China. Had every kilometer driven by private passenger EVs and fuel-cell drivetrains been covered by oil-powered ICE vehicles, daily oil demand would have been just over 0.37 million barrels higher in 2023.

The role of biofuels grows in the ETS. While the blend of biofuels increases as policies mandate higher levels, the outright volume decreases as total demand declines outpace any increase in blending rates. As a result, biofuels account for just 5.5% of road fuels in 2050, down from 6.3% in 2023.

# Global renewable fuel capacity has doubled in just four years

## Renewable fuel capacity, by company type




*Source: BloombergNEF. Note: Includes renewable diesel, renewable jet fuel, renewable gasoline and renewable naphtha. 'Unknown' includes capacity for projects that do not have an announced commissioning date.*

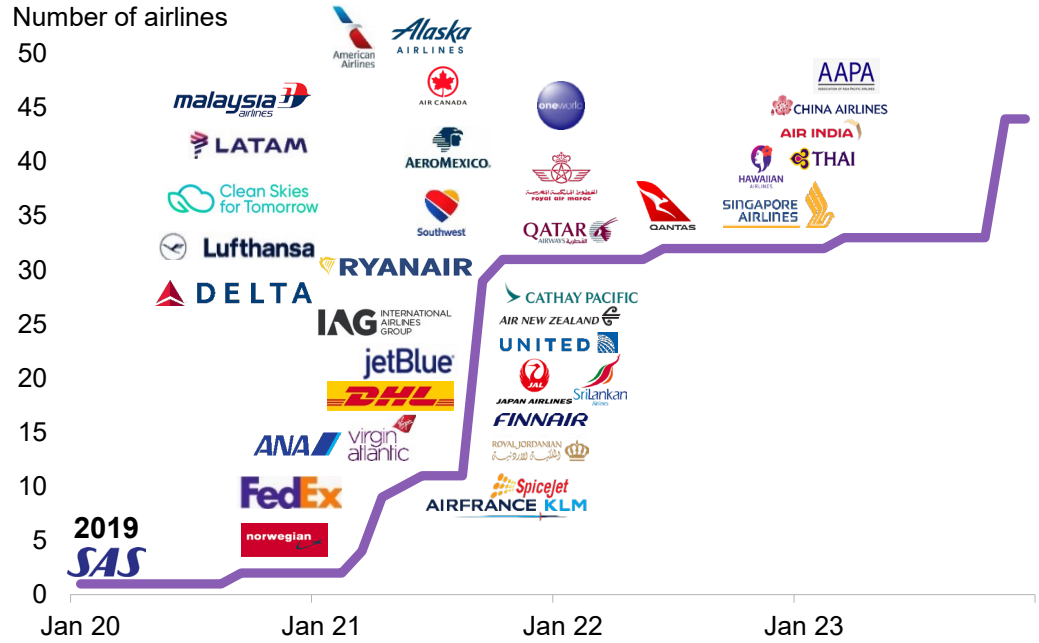
Renewable fuel capacity has jumped to 458 thousand barrels per day in 2023, up from under 190 barrels per day in 2020. Oil companies account for most renewable-fuel capacity currently, but announced projects indicate that other companies will gain traction in the next few years.

As the energy transition accelerates, oil companies are exploring new markets for a lower-carbon future. Renewable fuels activity and investment are growing, but rising competition means these clean fuels may offer a more limited market opportunity for oil firms than expected.

Renewable fuels like sustainable aviation fuel and renewable diesel are touted as a key means to reduce the scope 3 emissions of oil companies, but these companies' commissioned and announced capacity amounts to less than 1% of their total oil refining capacity. Renewable fuel efforts remain marginal compared with the traditional business of oil and gas. Just four of the more than 50 oil companies BNEF analyzed have planned renewable fuel production plans exceeding 5% of their refining capacity

# Nearly four dozen airlines have pledged to hit net zero

## Airline net-zero targets, by announcement date




*Source: BloombergNEF, company announcements.*

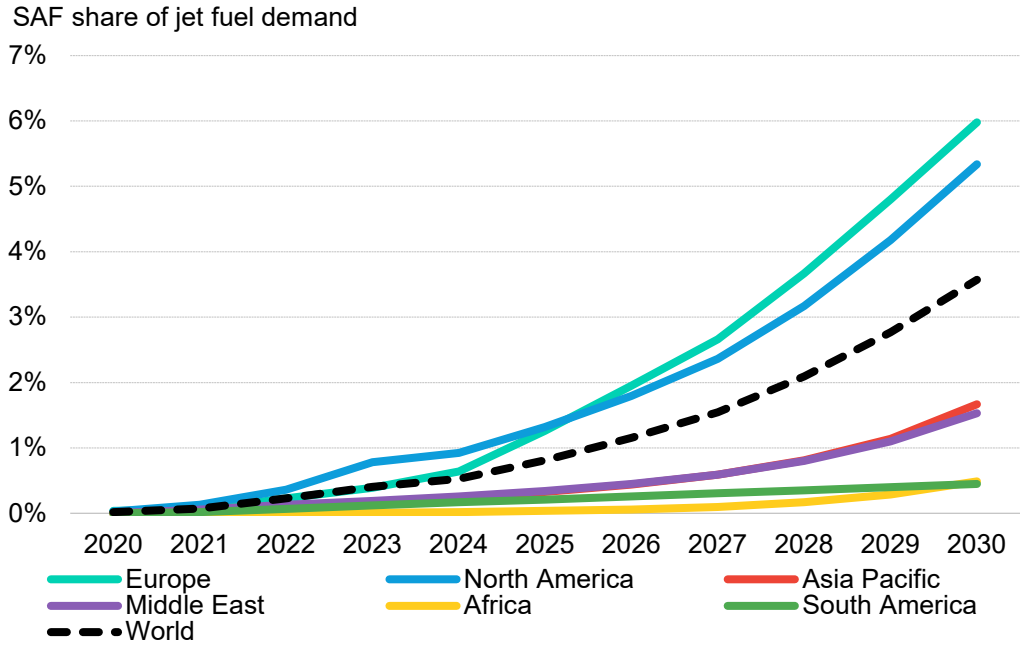
With sustainable aviation fuel (SAF) seen as the primary lever to reduce operational emissions long term, airlines continue to set targets for blending it with conventional fuels. So far, BNEF has tracked 44 airlines with some form of SAF target, either individually or through an alliance. These airlines accounted for just under half of jet fuel consumed globally in 2023.

Most have a goal for SAF to make up 10% of their overall jet fuel consumption by 2030. But there are outliers. Latam Airlines and Singapore Airlines each have a target of 5% by 2030, and freight carriers DHL and FedEx aim for 30% by the same year.

Initially, SAF targets were limited to the US and Europe. This is no longer the case, as airlines elsewhere have followed suit. After a lull in 2022, a resurgence of SAF targets was led by the Association of Asia Pacific Airlines (AAPA). Since SAF supply remains highly concentrated geographically, international carriers will rely on refueling in certain locations to raise their average blend.

# Sustainable aviation fuel's share of global jet fuel demand is taking off

## Global SAF blends, by region, in BNEF's ETS




*Source: BloombergNEF. Note: 'SAF' refers to sustainable aviation fuel.*

The nascent sustainable aviation fuel (SAF) industry continues to show promise, with the number of offtake agreements surging in the past two years as airlines demonstrate their commitment to the fuel and new projects boost anticipated production capacity.

In the ETS, the global SAF blend will rise rapidly to 3.6% of global jet fuel demand by 2030. This is predominantly led by airline activity in the US and policy targets in Europe. Europe's overall SAF blend rises to 6%, while North America's reaches 5.3%.

Global supply seems on track to meet demand throughout this decade – provided projects materialize on schedule and producers lock in adequate feedstock volumes, both of which remain key uncertainties. That said, even in BNEF's base supply case, the market may be oversupplied as of 2024 as demand initially grows slowly. This is likely to be short-lived as demand gains momentum.

# Industry sector

15 years of CEM | Power | Transport | **Industry** | Investment

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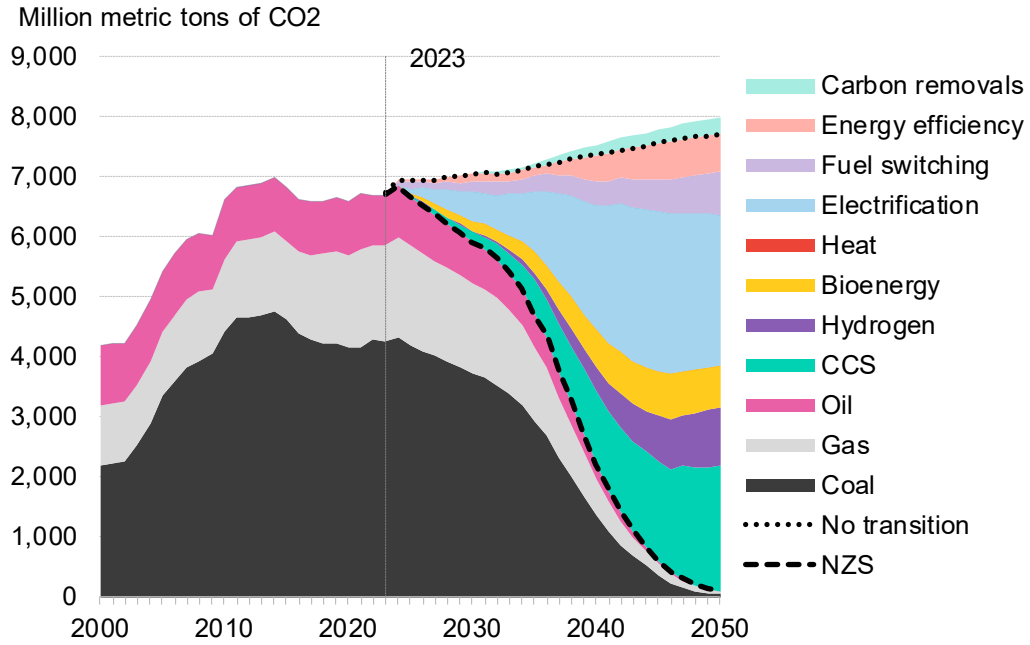
# Industrial decarbonization unfolds in two distinct phases

## Industry CO2 emissions reductions, NZS versus no-transition scenario




*Source: BloombergNEF. Note: 'CCS' refers to carbon capture and storage.*

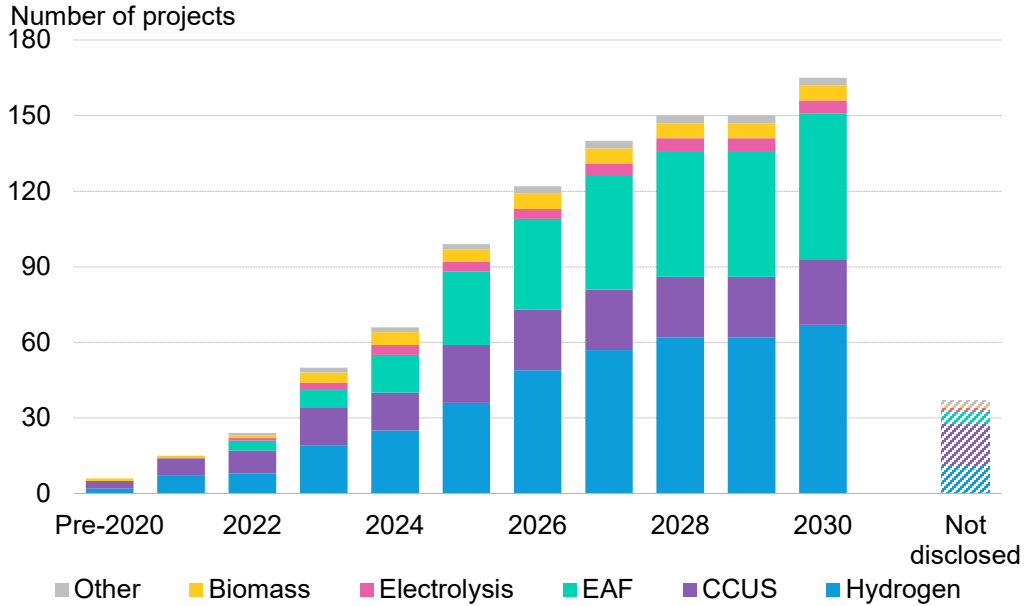
BNEF modeling suggests that industry will reduce its emissions more slowly than either the power or transport sectors. The technologies needed to decarbonize steel, cement and petrochemicals production are still at an early stage and will take time to scale. There is also a large existing asset base that will not reach its 'natural' retirement age before 2050. Most of this capacity is in emerging markets, putting a disproportionate burden of investment to retrofit or rebuild a young asset base on those regions.

Some 41% of emissions abatement this decade comes from electrification, while other technologies each account for 10-20% under this model. Come 2030, both hydrogen and CCS should have been demonstrated at scale, and their deployment can accelerate.

Over time, electrification's role in reducing emissions will diminish, but it will still be the key workhorse, responsible for a third of abated emissions in 2050. CCS is the second-largest contributor at mid-century, at 27%, while hydrogen and bioenergy make up 13% and 9%, respectively. Leftover emissions will be abated through recycling and fuel switching.

# Initiatives to decarbonize steel keep growing

## Cumulative steel decarbonization projects, by technology and commissioning year




Decarbonization initiatives in industry are accelerating. Low-emission iron and steel supply could grow eightfold globally between now and 2030.

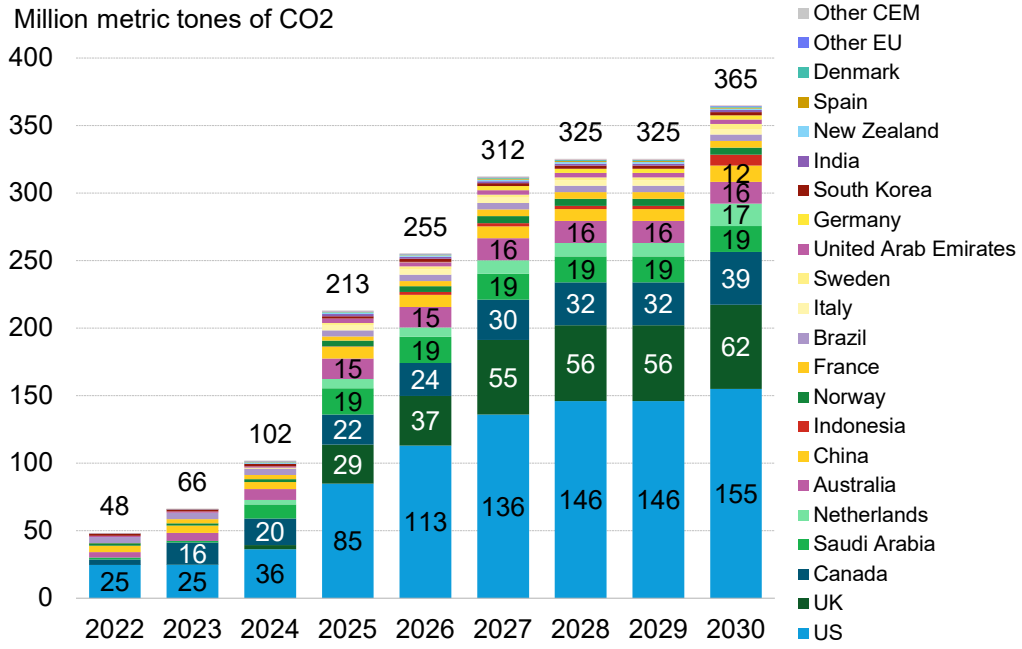
Recycling scrap steel in electric arc furnaces (EAFs) is the most mature technology for making low-emission steel today, but hydrogen projects make up most of the 202 announced projects due to be deployed by 2030. Carbon capture remains a niche solution, with most proposed projects small scale and early stage.

Low-emission steel capacity could expand eightfold to about 100 million metric tons by 2030 if all announced projects are commissioned. Close to 80Mt of direct reduced iron production capacity is expected to come online by 2030, though only about an eighth of this capacity plans to use green hydrogen from the start of operations.

*Source: BloombergNEF, public announcements. Note: Pre-2020 includes 2020. Projects without a commissioning year are labeled 'Not disclosed'. The direct reduction furnace (DR) and the electric arc furnace (EAF) in a DR-EAF project are counted as two separate projects. 'CCUS' refers to carbon capture, utilization, and storage.*

# Carbon capture is poised to ramp up mid-decade

## Expected CCUS capacity in CEM members, based on project announcements



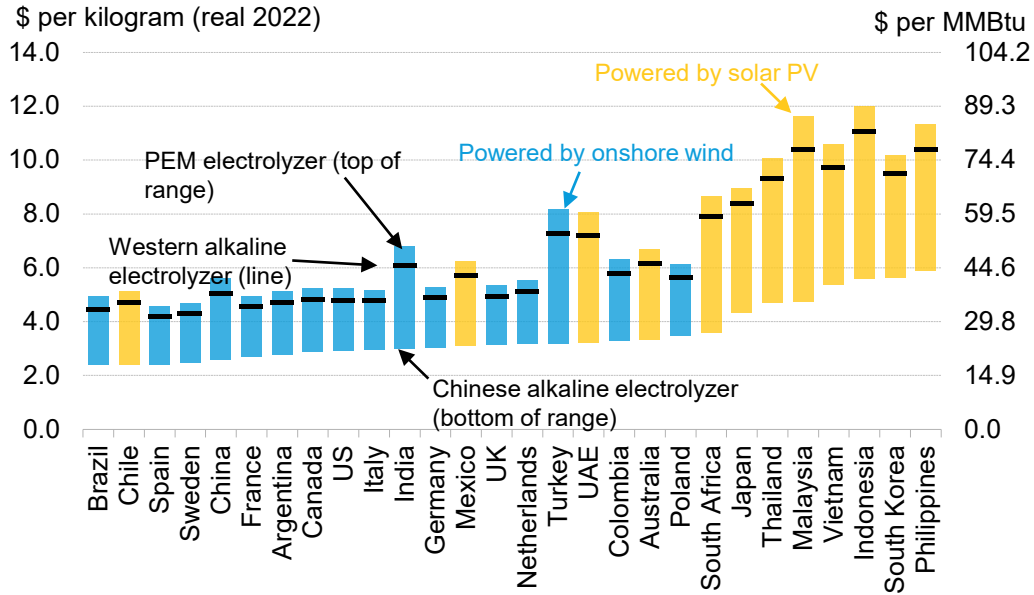

After two years of consecutive and dramatic growth, activity in the carbon capture industry starts to slow in 2025 in leading markets. Regulatory uncertainty is starting to bite in the carbon capture market, with barely any new capacity announcements added to the pipeline over the past few months. Since November 2023, the proposed annual carbon capture capacity by 2035 only increased by 4 million metric tons, to 424 million tons. This still represents an eightfold rise over the capacity that was operational at the end of 2023, but marks a significant slowdown from the flurry of announcements in the last two years.

Developers in leading markets are sitting on their hands as they wait for clarity on the policy landscape. While the US is poised to remain the top player, with a 39% share of global capacity in 2035, the delay in finalizing guidelines for the Inflation Reduction Act's 45Q tax credit is stalling projects. Meanwhile, in the UK and Canada, companies are holding fire until more details emerge on incentives and carbon pricing policies. The EU, on the other hand, is ramping up policy support for carbon capture.

*Source: BloombergNEF. Note: 'Other CEM' refers to Japan, Mexico, South Africa, Chile, Finland, Poland, Portugal and Russia. 'CCUS refers to carbon capture, utilization and storage.*

# Pricey electrolyzers and renewables are keeping green hydrogen expensive for now

## Levelized cost of hydrogen from cheapest available renewable power in 28 markets




Natural resources are the key to producing low-cost hydrogen with renewable power. Brazil operates onshore wind projects with some of the highest capacity factors in the world. Partly as a result, it has the world's lowest potential levelized cost for zero-carbon hydrogen at $2.38-$4.93 per kilogram. Chile, thanks to its exceptionally sunny conditions in some areas, also has the potential to produce hydrogen at relatively low cost ($2.39-$5.12/kg).

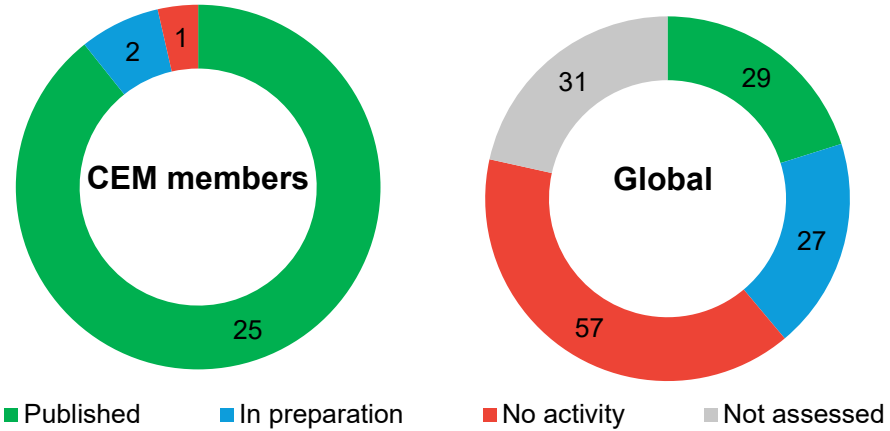
A large difference exists between Chinese alkaline electrolyzers (which are relatively cheap), western alkaline electrolyzers (mid-range) and PEM electrolyzers (relatively expensive). Since Chinese products are not readily available outside of China, many markets' practical cost range lies toward the upper end of the range.

Costs in markets on the lower end of the range come from cheap renewables and often high capacity factors from wind. The highest values occur where renewables are expensive with low capacity factors.

*Source: BloombergNEF. Note: Based on project financing year. Values at the bottom show cheapest hydrogen using a Chinese alkaline electrolyzer; values atop the range show cheapest values using a proton exchange membrane (PEM) electrolyzer, and black lines show cheapest values using a western alkaline electrolyzer. Electricity source is either solar or wind, whichever is cheaper. 'MMBtu' refers to million British thermal units, and 'PV' is solar photovoltaic. Chart considers values as of 2023.*

# Most major markets have a hydrogen strategy

## Number of hydrogen strategies as of March 2024



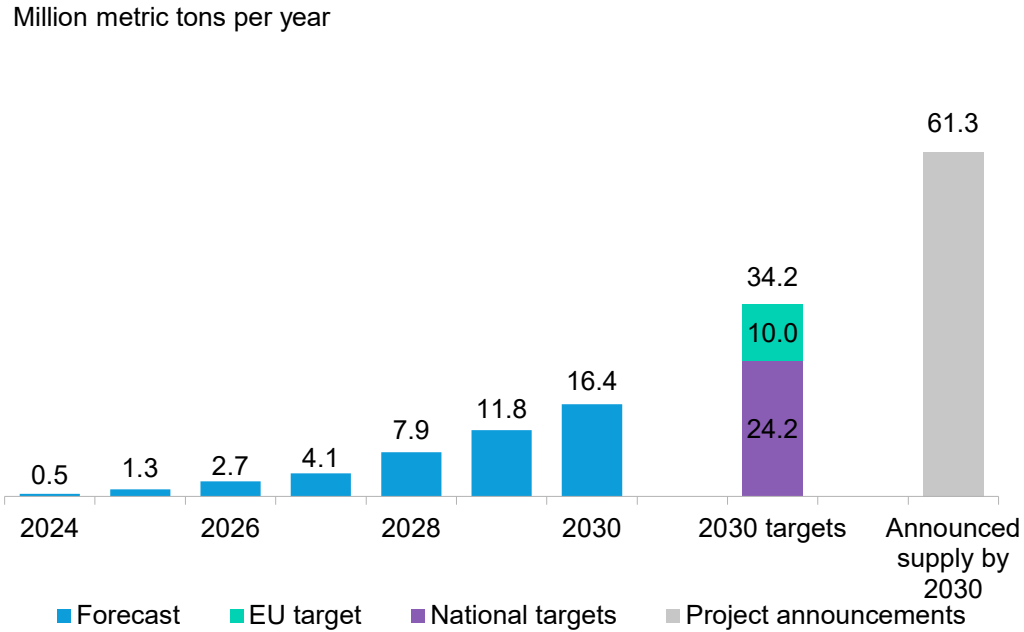

Globally, 54 markets had a hydrogen strategy at the beginning of 2024, and 30 were preparing one. Some governments, such as Japan, Germany and the US, have updated or given details on their strategies. Others, like Australia and the Czech Republic, are currently doing so. About 62% of the published strategies are in the Europe, Middle East and Africa region, followed by 21% in the Americas and 17% in Asia Pacific. By 2030, 16 markets aim to produce some 24.6 million metric tons of hydrogen per year, while 10 markets plan to use 24.6 million tons of hydrogen per year.

Outside the European Union, 25 CEM members have presented hydrogen strategies as of the beginning of 2024, with Brazil a recent addition to the list. New Zealand and Saudi Arabia have strategies in preparation, while Mexico has yet to demonstrate any activity on this front.

*Source: BloombergNEF.*

# Clean hydrogen supply forecast lags government goals, developer plans

## Clean hydrogen supply forecast




*Source: BloombergNEF.*

Annual low-carbon hydrogen supply is set to grow 30-fold by 2030, to 16.4Mt from 0.5Mt today. That implies an impressive 76% compound annual growth rate.

Yet it still falls far short of existing targets. National governments and the EU aim to produce nearly twice that – some 34.2Mt per year of low-carbon hydrogen by 2030. Project developers are more aggressive still, having proposed 61.3Mt of annual H2 production capacity by 2030.

More ambitious policy implementation could still raise BNEF's forecast, but the window for policies to impact deployment through 2030 is narrowing. Projects take an average of five to six years from announcement to completion in most parts of the world.

# Stronger quotas and carbon prices are needed

## Hydrogen strategies as of May 2024

| Policy signpost | AMER | APAC | EMEA |
|---|---|---|---|
| $H_2$ strategies and targets | Most major markets have an $H_2$ strategy. Some have targets. | Most major markets have an $H_2$ strategy. Some have targets. | Most major markets have an $H_2$ strategy and targets. |
| Government funding | $188 billion in funding available, most for $H_2$ producers. | $32.5 billion available, an order of magnitude below AMER, EMEA. | More than $140 billion available, more for users than AMER. |
| Enforceable demand quotas | No quotas for clean hydrogen use in AMER. | South Korea has hard to enforce quotas; not all are for clean $H_2$. | EU has the strongest $H_2$ quotas; some may be hard to enforce. |
| Carbon prices that bite | Missing or insufficient carbon prices in all AMER markets. | Missing or insufficient carbon prices in all APAC markets. | EU and UK have $CO_2$ pries and plan to limit exemptions. |
| $H_2$ midstream development | US firms are building salt caverns, but with little policy support. | Chinese firms are planning pipelines, but policy support is low. | Pipeline policy is starting to emerge in the EU and UK. |

*Source: BloombergNEF. Note: Green indicates on a good track, yellow indicates some progress, and red indicates more effort needed. 'AMER' refers to the Americas, 'APAC' is Asia Pacific, and 'EMEA' is Europe, the Middle East and Africa.*

Most major markets have hydrogen strategies and targets. But to meet the targets, most governments need to strengthen demand incentives, limit exceptions for carbon prices and support midstream producers. Government funding for clean-hydrogen users would help producers, too, by increasing demand for the fuel.

More governments should set enforceable quotas for hydrogen use. Carbon prices have been ineffective, due to exemptions for sectors with a higher chance of clean hydrogen adoption. Policies to incentivize midstream infrastructure development would help connect producers and users.

Hydrogen subsidies reached over $360 billion by April 2024, but while 65% of the money is for hydrogen supply, only 5% is for demand. The rest is for midstream hydrogen, or supply and demand combined. This adds to an imbalance in the market: most proposed clean hydrogen supply lacks an offtaker.

# Investment

15 years of CEM | Power | Transport | Industry | **Investment**

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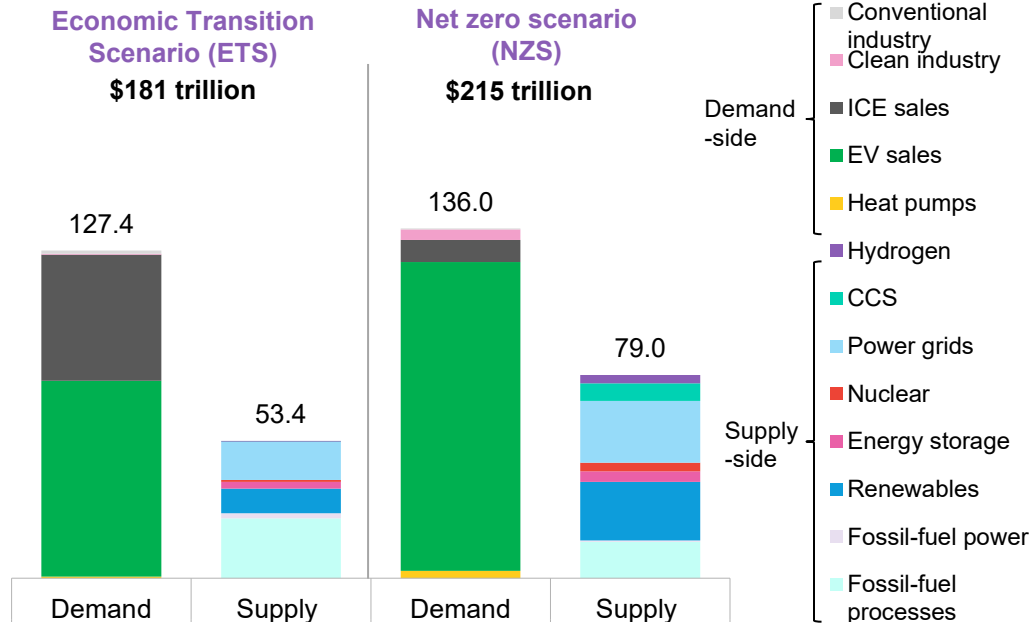
# Reshaping energy systems will require a substantial scale-up of capital

## Global energy investment and spending across 2024-2050



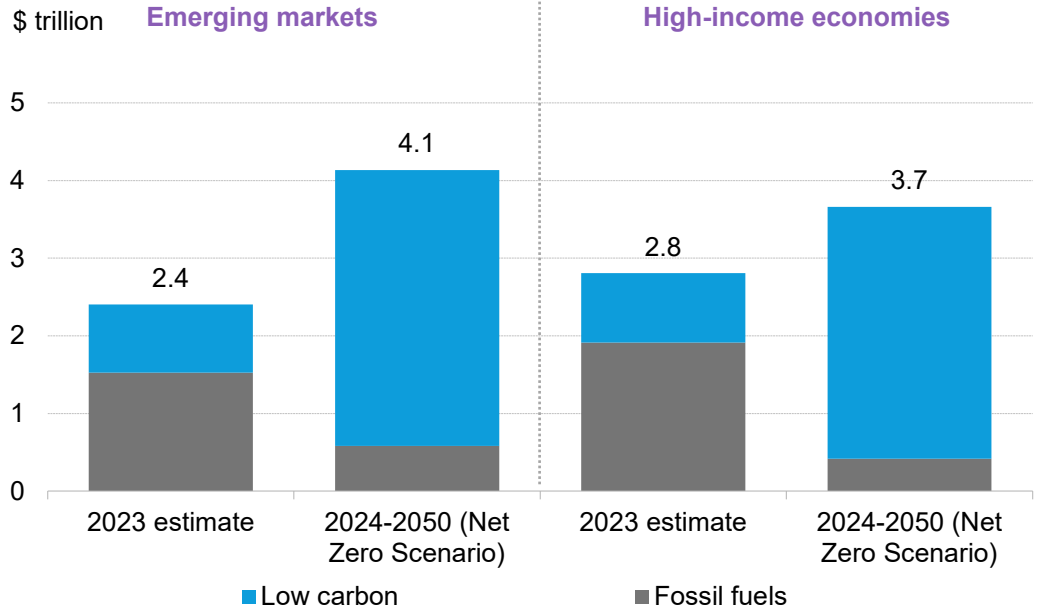

Today, energy supply investment is spread roughly evenly across fossil fuels and low-carbon sources, at over $1 trillion apiece. Getting on track for the NZS requires a significant step up for clean energy supply and a gradual scaling down for fossil fuels. For every dollar invested in fossil-fuel supply over the rest of this decade, three dollars must go to low-carbon energy – or $2.7 trillion of annual investment in clean energy verses $0.9 in fossil fuels.

Reshaping and decarbonizing today's energy systems will require a substantial scale-up of capital directed toward low-carbon assets and infrastructure. Global investment across the power, transport, industry and buildings sectors amounts to $181 trillion between 2024 and 2050 in the ETS. The total is almost a fifth higher in the NZS, at $215 trillion. While neither sum is insignificant, they equate to less than 5% of the world's gross domestic product annually over the next two years.

*Source: BloombergNEF. Note: 'ICE' is internal combustion engine, 'EV' is electric vehicle, and 'CCS' is carbon capture and storage. The numbers above the bars indicate cumulative investment and spending figures from 2024 to 2050.*

# Emerging markets need to boost average annual investment to hit net zero

## Annual average for total energy-system investment in the Net Zero Scenario




*Source: BloombergNEF, scenario estimates from the* New Energy Outlook 2024. *Note: Estimates for 2023 are based on BNEF analysis and exclude conventional industry and fossil-fuel boilers, though these sums are expected to be minimal.*

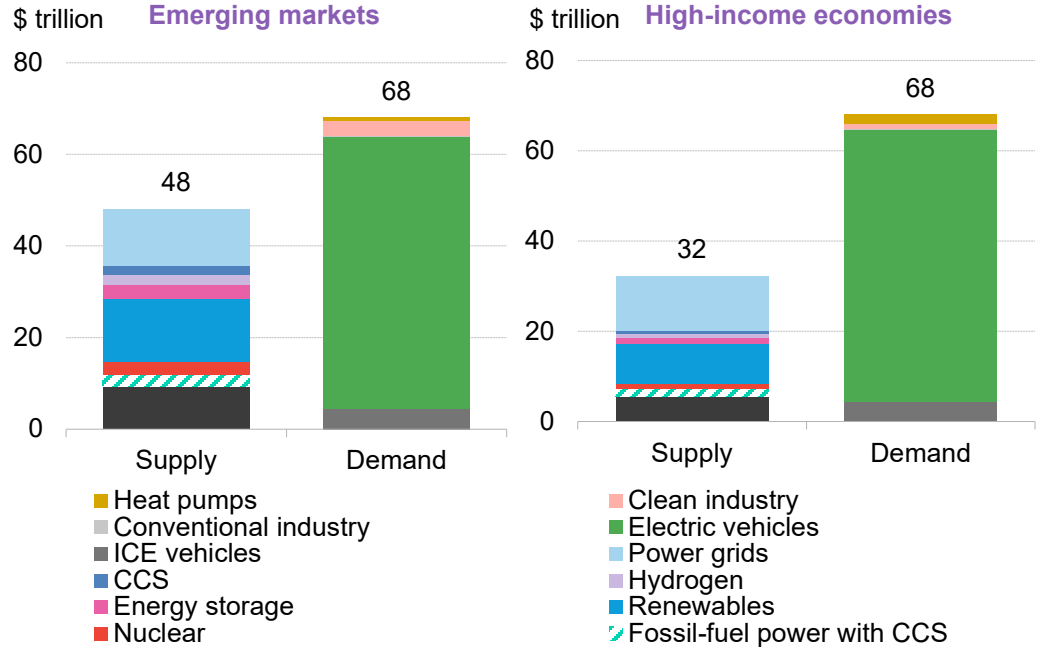
A net-zero energy transition requires $116 trillion of emerging market investment over 2024-2050 – or $4 trillion per year on average. Techno-economic trends are expected to close some of this gap, raising annual investment to $3.8 trillion in the base case, although that still falls short net-zero needs.

Total energy-system investment in high-income economies is already higher than in emerging markets, primarily due to higher uptake of internal combustion engine vehicles as well as the increased low-carbon supply-side capex. Techno-economic developments cause little change in the energy-system investment level over 2024-2050 under the base case, though the low-carbon share expands. But for net zero, high-income economies need to raise annual investment by 27% relative to the base case – three times the emerging markets' gap in percentage points.

Some fossil-fuel investment in both high-income economies and emerging markets is needed under a net-zero pathway, as this supply still plays an important role in hard-to-abate sectors.

# To reach net zero, most investment in emerging markets is spent on EVs

## Total energy-system investment in the Net Zero Scenario, 2024-2050



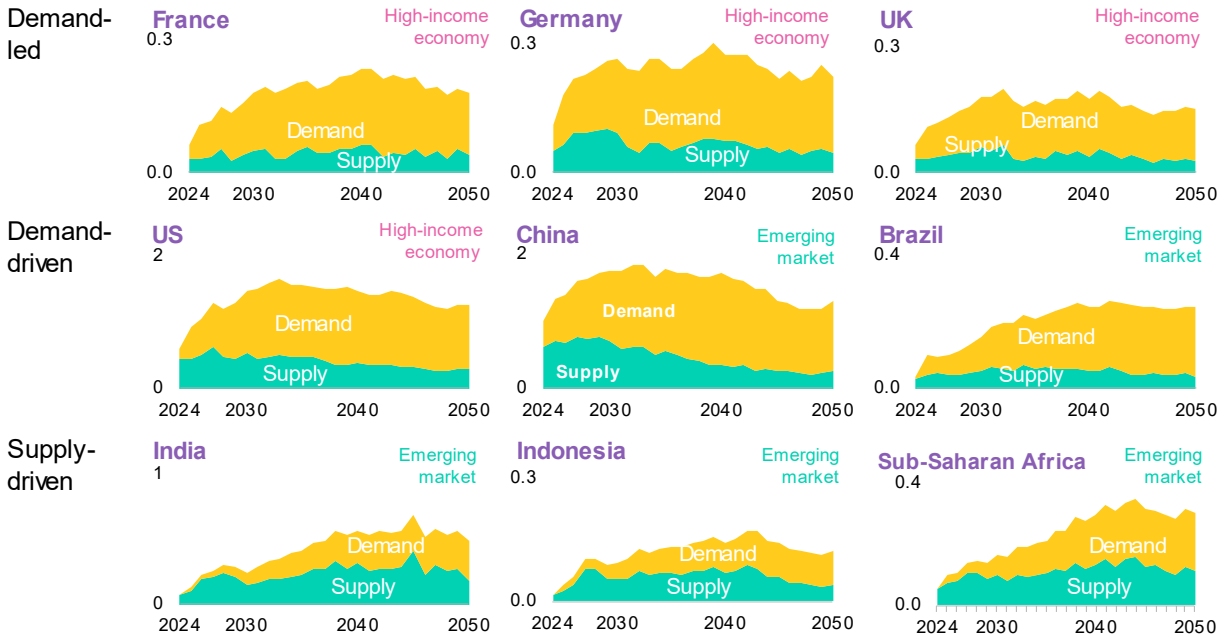

*Source: BloombergNEF. Note: 'CCS' refers to carbon capture and storage.*

Electric vehicles account for roughly half of energy-transition investment in emerging markets in the Net Zero Scenario, a far greater share than any other single sector.

Renewable power capacity and power networks are a distant second and third, at 12% and 11% of investment, respectively. However, emerging markets have a greater share of investment flowing to fossil fuels than wealthier markets even net-zero pathway, at 8% compared with 5% for high-income economies.

# Low-carbon investment in many emerging markets begins more supply side driven

## Low-carbon investment and spending in the NZS ($ trillion)



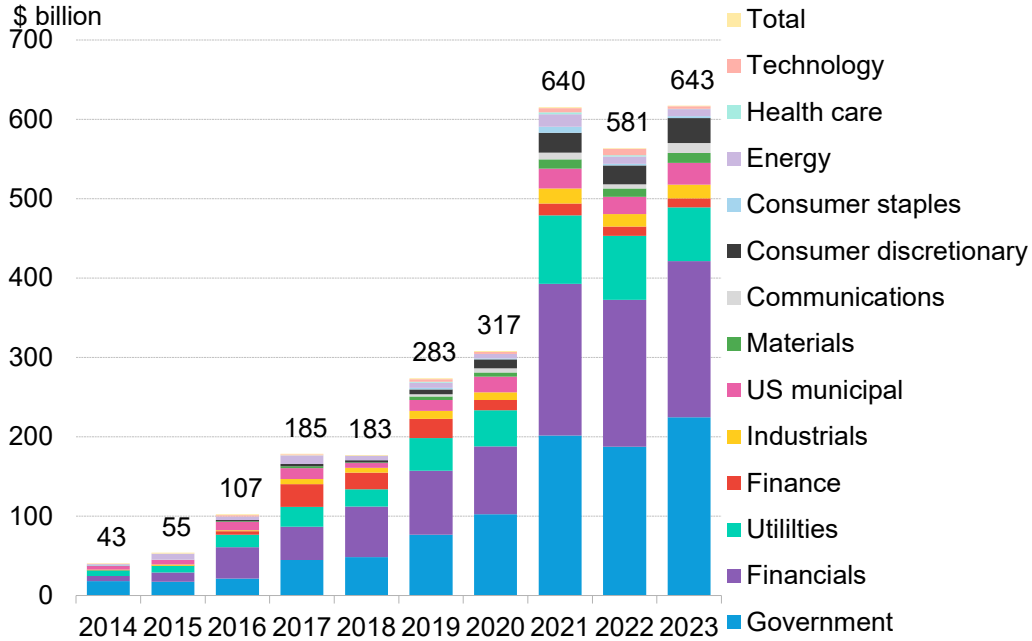

*Source: BloombergNEF. Note: Scale varies across economies, to better depict the annual investment and spending composition.*

In a net-zero pathway, China and Brazil see low-carbon demand-side spend start to overtake supply-side investment toward the end of this decade, mainly as EV spending ramps up with time. However, low-carbon demand spend is slower in some emerging markets like India and Indonesia, only overtaking supply-side investment in the 2040s. The latter stays relatively high to facilitate deep decarbonization and the buildout of clean power systems to displace fossil fuels.

Broadly speaking, high-income economies are demand-driven. However, for some wealthy nations like France, Germany and the UK, low-carbon energy demand investment immediately outstrips energy supply. These countries already enjoy supportive policy environments to drive EV uptake.

# Green bond issuance reached a record high in 2023

## Global green bond issuance, by sector



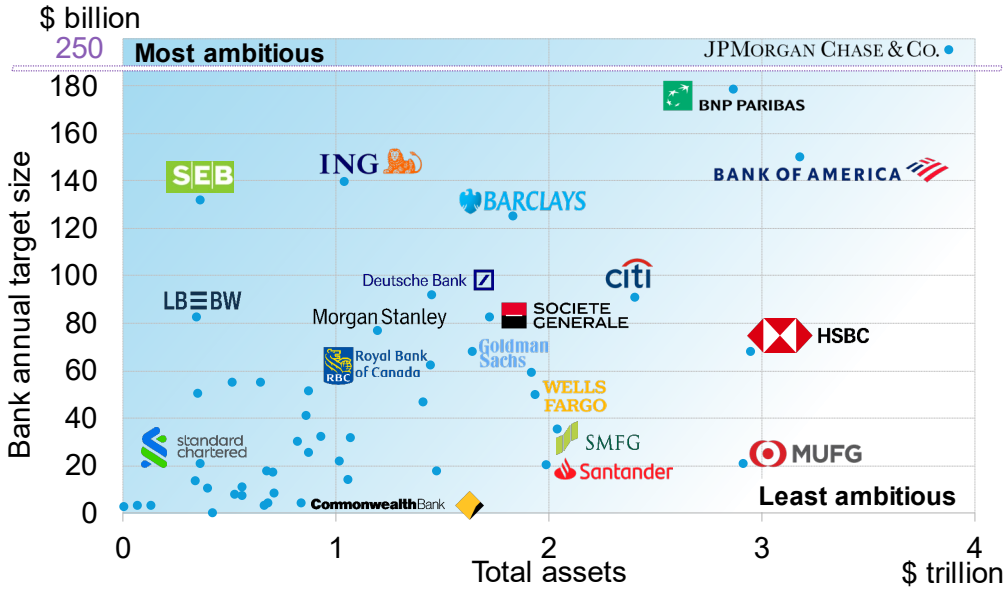

Green bonds issuance rose to $643 billion last year, up 11% from 2022. Governments, financials and utilities are the biggest issuers of green bonds. At $224 billion, governments account for over 34% of green bonds issued in 2023. Financials followed, accounting for around 30% of the market. Utilities, at $68 billion, were the third-largest sector, accounting for 11% of the market, despite a 16% drop compared with the previous year.

These top three sectors dominate the market, making up more than three-quarters of global issuance last year. Yet other sectors observed the highest growth, albeit in smaller volumes. Communication and consumer discretionary companies saw issuance jump 127% and 31%, respectively.

*Source: BloombergNEF, Bloomberg Terminal. Note: Includes tap issues, municipal bonds and mortgages. Sector based on Bloomberg Industry Classification Standard Level 1.*

# Banks are recognizing the important role they can play in decarbonization

## Bank sustainable finance targets relative to total balance sheet assets




Banks around the world are stepping up their climate game after facing growing scrutiny for fossil-fuel lending. They have set large commitments to finance sustainable activities: as much as $18 trillion by 2030 from 53 of the world's largest banks, up from under $1 trillion in 2012.

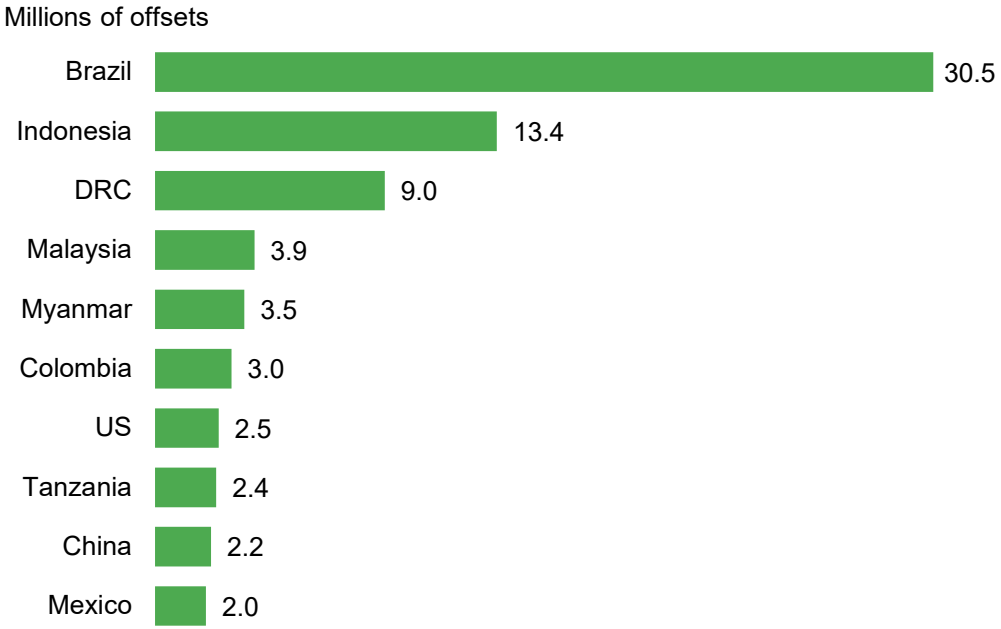
Banks' climate transition plans intend to promote climate targets into concrete strategies and actions. To walk the talk, banks will first need to show credibility in their own commitments and plans.

Definitions and level of disclosed details vary highly between institutions. Seven out of 10 banks surveyed by BNEF describe metrics used to evaluate their clients' transition strategies. From those, only two quantify the expected financial impacts from the transition.

*Source: BloombergNEF, bank sustainability reports. Note: As of March 2024. Bank annual target size is the total target size divided by the duration of the target. Total assets are used as a proxy for reflecting all bank activity. The SEB target excludes sustainable savings portion of its "green" indicator due to limited reporting.*

# Brazil could be the model country for nature-driven climate mitigation

## Top suppliers of nature-based offsets, 2024-2050




*Source: BloombergNEF, Nature4Climate. Note: DRC is Democratic Republic of Congo.*

No country comes close to Brazil in terms of nature-based abatement potential. Now Brazil needs to establish itself as a carbon offset supply hub for domestic and international companies with net-zero goals. BNEF estimates that over 2024-2050, the country could create nature-based carbon offsets for up to 30.5 gigatons of $CO_2$ equivalent. With proper investment, some 75% of the abatement in Brazil to 2050 could come from avoided deforestation, known as REDD+, followed by reforestation at 23% and sustainable agriculture practices at 2%.

Brazil's fledgling offset market will need to make a big U-turn to reach this potential. The country issued a record 25.4Mt$CO_2$e of offsets in 2021, but supply plummeted to 7.6Mt$CO_2$e in 2022 and 5.6Mt$CO_2$e in 2023. Issuance has historically been top-heavy, coming from a handful of large REDD+ projects with inconsistent quality.

Scan the QR code to find BNEF's *Brazil Transition Factbook*, which includes key data and insights on the country's energy transition.

# Methodology note: BNEF's New Energy Outlook presents scenarios for the transition to a low-carbon economy

This report builds on the results of the *New Energy Outlook 2024*, BloombergNEF's latest energy and climate scenarios, published in May. One of BNEF's flagship publications, the *New Energy Outlook* models the power, transport, industry and buildings sectors to 2050 using bottom-up subsector models for 12 countries and seven regions, with additional power sector detail for 19 markets. It covers 16 subsectors and more than 75 decarbonization technologies.

The core scenario used in BNEF's research is the **Economic Transition Scenario**, which lays out how commercially available technologies could be deployed based on the underlying economic fundamentals of the energy transition and in the absence of new policy regimes. It employs a combination of near-term market analysis, least-cost modelling, and consumer uptake and trend-based analysis. The **Net Zero Scenario**, by contrast, describes a tough but achievable stretch that reaches net-zero emissions and keeps temperatures well below 2C by mid-century, via an orderly transition using current technologies.

## Economic Transition Scenario (ETS)

- Exploratory base case that describes how the power, industry, transport and buildings sectors might evolve as a result of cost-based technology changes.
- Consistent with **2.6C** warming by 2100.
- Assumes no further policy support for the energy transition beyond existing measures.
- The low-carbon transition is largely limited to the power and transport sectors.

## Net Zero Scenario (NZS)

- Normative climate scenario that describes a tough but achievable stretch to get on track for net-zero emissions by 2050 by meeting sectoral carbon budgets.
- Consistent with **1.75C** warming by 2100.
- No overshoot or reliance on net-negative emissions post-2050.
- Fully decarbonizes power, transport, industry and buildings by 2050.

Scan the QR code for more details on BNEF's *New Energy Outlook*.

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BloombergNEF (BNEF) is a strategic research provider covering global commodity markets and the disruptive technologies driving the transition to a low-carbon economy.

Our expert coverage assesses pathways for the power, transport, industry, buildings and agriculture sectors to adapt to the energy transition.

We help commodity trading, corporate strategy, finance and policy professionals navigate change and generate opportunities.

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